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# Valuation of ecosystem services: The case of Orseg National Park, Hungary

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VALUATION OF ECOSYSTEM SERVICES: THE CASE OF ŐRSÉG NATIONAL  
PARK, HUNGARY

BY

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THESIS

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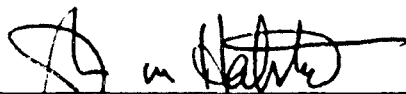
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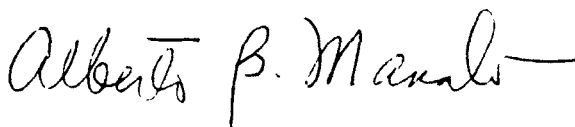
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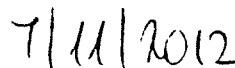
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Date

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## **ABSTRACT**

### **VALUATION OF ECOSYSTEM SERVICES: THE CASE OF ŐRSÉG NATIONAL PARK, HUNGARY**

by

Ildiko Losonci

University of New Hampshire, September, 2012

A chronic lack of sufficient financial resources has prevented many protected area professionals from achieving adequate ecosystem protection. Using a case study of Őrség National Park in Hungary and the contingent valuation technique, we examined the relative importance of various ecosystem services to respondents, their WTP for these services, and the oath of honesty's effect on hypothetical bias.

Results from the intercept survey that was administered in the park in the summer of 2011 and filled out by 212 respondents show that visitors prefer the protection of the park's cultural monuments, and ecosystems services like local natural food, climate regulation and recreation. Their mean WTP for a daily user fee to protect the park is 655 HUF. This results in an amount of 215,495,000 HUF economic rent that, if captured could increase the park budget by 49%. The oath of honesty did not have a significantly negative effect on WTP.

## CHAPTER I

### INTRODUCTION

#### **Biodiversity and Ecosystem Services**

Biological diversity or biodiversity represents not only the “number of different species of plants, animals and microorganisms in existence”, but the “specific genetic variations and traits within species as well as the assemblage of these species within ecosystems” (CBD, GBO2 2006, 9). It is understood that biodiversity is necessary for healthy ecosystem functioning (Hooper et al. 2012). Ecosystems provide environmental goods and services<sup>1</sup> that play an important role in the survival of humans (Diaz et al. 2006). Societies all over the world exploit nature for its ecological, economic and aesthetic-cultural values. We all obtain services provided by ecological processes, such as watershed protection, climate regulation, soil maintenance and generation, just to name a few. Economic values come for example in the form of food, timber, energy, chemicals and medicine. More than 60 percent of the global population depends on plants for their medicine. Aesthetic-cultural values like nature tourism are also provided through ecosystems (Guruswamy and McNeely 1998).

However, the overexploitation of these goods and services as well as other anthropological activities, such as introduction of invasive alien species, nutrient loading, change of habitat and climate change have triggered a continuous loss of the Earth's

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<sup>1</sup> From now on referred to as ecosystem services.

biodiversity. This means species populations are declining, species are going extinct or getting very close to extinction, genetic diversity is getting smaller and terrestrial habitats, marine and costal ecosystems are becoming fragmented, altered, and exploited at an unprecedented rate (CBD, GBO3 2010).

The most recent and comprehensive global assessment on human impact on the Earth's biodiversity and ecosystems is the Millennium Ecosystem Assessment (MA 2005). The MA report's Ecosystems and Human Well-being: Biodiversity Synthesis's findings are eye-opening. The authors state that over half of the world's biomes have already undergone a 20-50 percent conversion to human use and that "during the past few hundred years human-induced species extinction rates have increased" rapidly (Chape et al. 2008, 162). With this current loss of biodiversity the Earth's system can easily be pushed beyond its tipping point, where changes are not reversible any more. But even if we do not reach the tipping point, biodiversity loss and the degradation of ecosystem services will impact all societies due to our dependence on nature's goods (CBD, GBO3 2010).

### **The Role of Protected Areas in Biodiversity Conservation**

Protected areas that represent natural and semi-natural areas and are set aside for protection, special or restricted use, can play an important role in habitat and biodiversity protection while conserving local ecosystems. The establishment of the first protected areas can be highly interlinked with the colonization of Western nations in Africa, the Americas, Asia, Australia, and several oceanic islands. When colonists realized the disappearance of local ecosystems due to urbanization and industrialization they thought a quick solution to the problem would be the establishment of nature parks. With this

approach the goal was to preserve the remains of the local ecosystems in a way that it highly restricted the local and indigenous communities from using the natural resources. This type of approach of setting aside protected areas emphasizes wildlife, wilderness and scenic protection in the parks that are managed as isolated islands with the intention to also attract tourists. Phillips (2003) noted that based on this approach these areas are viewed as national concerns and assets, run by the central government and managed reactively within a short timescale. This traditional paradigm of establishing parks remained the case until the second half of the 20<sup>th</sup> century. Only in the most recent decades, after the role of protected areas had been acknowledged not only in biodiversity protection but in sustainable development as well, has this approach been criticized for several reasons. First, while protected areas through the conservation of ecosystems and the provision of essential goods and services no doubt contribute to human well-being, they cannot effectively be used as sustainable development tools as long as their establishment excludes the local communities. Second, the establishment of protected areas does not necessarily result in adequate protection if the protected area management is not effective enough; or if these areas are not design to best maintain biodiversity due to inadequately covering necessary habitats and species (Chape et al. 2008).

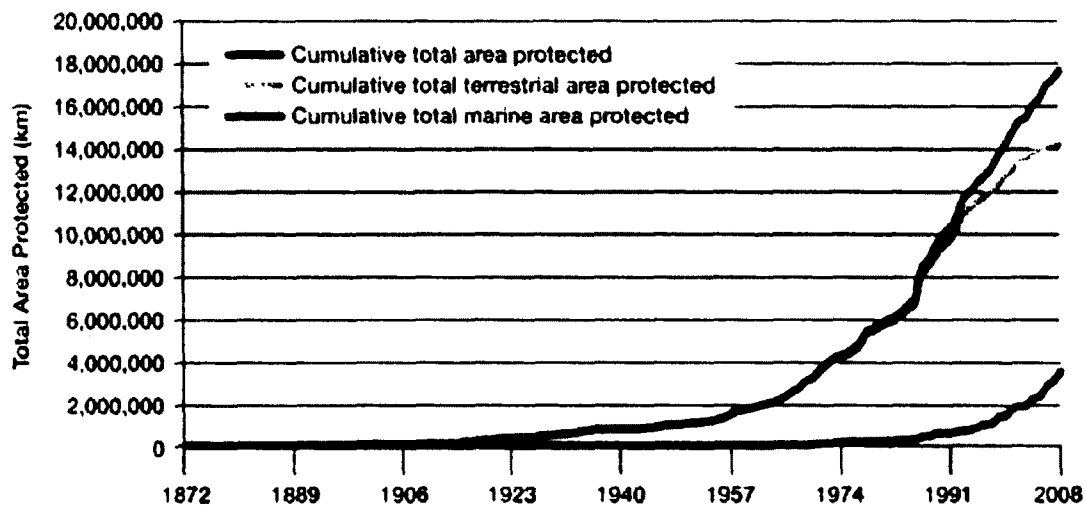
The international protected area community acknowledged these deficiencies and in 2003 at the Vth World Parks Congress proposed a new approach for protected areas. This new approach was put into an action plan and it most importantly called for the need of local and indigenous community involvement, long term management methods and increased financial resources. The action plan largely influenced the outcomes of the Programme of Work on Protected Areas that was adapted by the Contracting Parties to

the Convention on Biological Diversity (CBD) in 2004. This took the recommendations of the 2003 World Parks Congress into an intergovernmental and legally binding level, and recognized the role protected areas in biodiversity protection and the pursuit of sustainable development while calling for the establishment and maintenance of comprehensive, effectively managed, and ecologically representative national and regional systems of protected areas (Chape et al. 2008).

### **General framing of the Problem**

Due to the realization and acknowledgment of protected areas' role in conserving biodiversity and ecosystems, the number of designated areas has significantly grown worldwide. While in 1965 there were just a little more than 10,000 protected areas, by 2005 this number had increased to more than 70,000 and by 2008 it went above 120,000. Along with an increase in the number of protected areas comes an increase in the overall percentage of protected land and sea. Figure 1 (that excludes protected areas with an unknown year of establishment) clearly shows this growth and tells us that while in 1965 there were about two and a half million square kilometers of the entire Earth's surface designated as protected areas, this number had reached 18 million by 2008. This means that 12.2 percent of global land, 5.9 percent of the Earth's territorial seas and 0.5% of the extraterritorial sea are now protected (World Database on Protected Areas).

**Figure 1: Growth in nationally designated protected areas from 1872 to 2008**



Source: UNEP-WCMC 2009

This global increase in protected area coverage is definitely remarkable and it shows a positive policy response to address biodiversity loss. As already noted above though, the designation of protected areas alone does not guarantee effective biodiversity protection. Another important element to this is the management effectiveness of these areas.

The achievement of effective protected area management depends on several things, but according to several protected area professionals most essentially on the provision of financial resources (UNEP/CBD/WG-PA/2/INF/7. 2008). Adequate financial resources allow protected area managers to effectively implement operational goals. Unfortunately though, the provision of financial resources has not kept up with the current increase in global protected area numbers. A survey completed by protected area representatives shows that in between 1992 and 2002 financial resources provided by government agencies and donors decreased. Even though there was an increase in funds



provided by non-governmental organizations and subtracted from user fees, representatives agreed that this additional funding was not enough to keep up with the cost caused by the increased coverage (Chape et al. 2008).

Lockwood et al. in 2008 (cited by Chape et al. 2008) stated that many protected areas still heavily rely on government funds, which are limited and as the above mentioned survey results show, they can even decrease. This results in a shortage of financial resources and creates obstacle for effective management.

Participants at the Vth World Park Congress concluded that “an annual sum in the region of \$20-30 billion USD would be required over the next 30 years to establish and maintain a comprehensive protected area system including terrestrial, wetland, and marine ecosystems” (Chape et al. 2008, 173). They also estimated that compared to this required amount only US\$ 6.5 billion is available for managing the existing protected area system. The problem with this amount is not only is it significantly smaller than the required amount would be, but that its distribution is unequal, since half of it is spent in the USA alone (Chape et al. 2008).

Emerton, Bishop and Thomas (2006) in their global review of Sustainable Financing of Protected Areas stated that there is about US\$ 350 million less total global development assistance available for public protected areas in the developing world than there was in the early 1990s. They also say that due to progressive deregulation and decentralization in both developing and developed countries protected areas receive low priority in terms of public spending. Donor funding is decreasing as well, while donors tended to redirect their support from conservation and protected areas. Consequently they called for the identification and addition of new financial resources to adequately meet

the financial needs of the global protected area network and to manage them in a way that conservation priorities can be fulfilled.

A report done by the Institute for European Environmental Policy on financing Natura 2000 sites<sup>2</sup> in 2011 also urges to find solutions for the insufficient financial resources that conservation areas have to face with. The report while analyzing possibilities for the use of new and innovative financial mechanisms provides a context to what innovative financing means. Thus, the authors say that one aspect of innovative financing is establishing a link between conservation areas and the ecosystem services they provide. This means to complement finances available for conservation with funding that is gained from those who enjoy the benefits of conservation areas and biodiversity, i.e. ecosystem services. The authors of the report divide these to public benefits (air quality, landscape, climate, cultural heritage) and private benefits (private firms or individuals benefit from recreation, water purification/availability, etc.) (Kettunen et al. 2011).

### **Payment for Ecosystem Services**

When economic rents (willingness to pay for benefits) created by uses of conservation areas are captured we talk about Payment for Ecosystem Services (PES). “PES schemes rely on establishing an indirect link between service providers and beneficiaries” (Dixon 2011, 310). In a broader definition “Payment for Ecosystem Services is an approach to environmental management that uses cash payments or other

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<sup>2</sup> Natura 2000 is an adapted legislation by the European Union (EU) “to protect the most seriously threatened habitats and species across Europe.” Natura 2000 sites are required to set aside by all EU member states to preserve vulnerable bird, animal and plant species and their habitats (NATURA).

compensation to encourage ecosystem conservation and restoration” (Milder et al. 2010, 1).

Dixon (2011) identifies a variation on PES that he calls direct rent capture (DRC). He defines it as an approach in which “the service provider uses economic tools and policies to collect “economic rents” from the beneficiaries to help pay for conservation. DRC often takes the form of targeted admission or user fees and shows considerable promise for enhancing the conservation and management of certain sensitive areas” (Dixon 2011, 310) while easing budgetary problems. Dixon (2011) points out that for the DRC approach to work both users and providers need to value the maintenance of service flow, the users must have the (willingness) and ability to pay for services, and in the case of recreational uses of conservation sites there has to be an existing visitor industry where some level of use is acceptable and environmentally sustainable.

Even though the utilization of admission or user fees for entering to a national park has been common and widely accepted in many countries, especially in the United States, it is still not used everywhere to complement park budgets. Many – especially citizens of economies in transition – may think natural areas should be accessed for “free of charge”, as they are gifts of nature (Dixon 2011). Thus, it is relevant for policy makers to consider attitudes toward and valuation of ecosystem services in various countries.

This research involves valuation of ecosystem services, under the auspices of local and global public goods, in Őrség National Park, Hungary. With this study our main goal is to determine the feasibility of a payment for ecosystem services (direct rent capture) scheme in the national park where the majority of the park budget, which is provided by the government, is decreasing (Szentirmai 2011).

Dixon (2011) noted that by capturing part of the values associated with conservation lands, especially when tourism and recreational uses are involved, can lead to improved management and conservation of these areas. While studying both marine and terrestrial parks, he concluded that where funds for conservation management was limited, capturing the direct economic rent generated from fees that visitors are willing to pay to use the parks has led to improved funding and management.

### **Ecosystem Service Protection in Őrség National Park**

Őrség National Park lies in the most western part of Hungary, bordering Austria and Slovenia as shown in Figure 2. Its land consists of forests and meadows and its history goes back to the settlement of the Magyars in Hungary (895), when guardians were placed to the Western border to protect the land of Magyars from other nations. This is where it also received its name, Őrség means guard.

**Figure 2: Location of Őrség National Park**



Source: Google Images

The area was designated as a National Park in March 2002. It has open boundaries with residents living within its geographic area, who have always lived in harmony with nature, consciously preserving its values and diversity. This allowed the region to stay highly forested in contrast with other parts of Hungary – 63 percent of the area is covered by forest while the national average is only 18 percent. Due to the area's high forest coverage and its most Western feature the region stayed sort of separated from other parts of Hungary, which allowed the development of unique ethnographical and cultural-historical values. Growing development that has been characterizing Hungary since the 1989 political change made it necessary to now give a nationally legal protection of this special land. This protection ensures that 44,000 hectares is managed in a way that realizes the best preservation of the three types of land that characterizes this area: forests, meadows and wetlands. Due to its relatively separated feature, governmental centralization – that was common in the pre 1989 time – avoided this area; therefore private ownership could survive as a dominating form of proprietary right. The land of Órség National Park consists of 44 towns whose residents own several land types.

Though the majority of the area is privately owned it enjoys a public land type protection that equally prioritizes to conserve the natural as well as the unique cultural and historical values. This means the protection of 111 plant species and several wildlife species that live in Órség's habitats, like crabs, frogs, fish, butterflies, black storks, eagles and otters – just to name a few – as well as the fortress type churches and other architectural monuments preserved from times starting from the Hungarian conquest. The whole territory of the national park is under the Natura 2000, which is a European Union

wide protection standard, of which 3,086 hectares are strictly protected with limited access (ONP).

Both ecological and cultural values attract visitors to Örség National Park, who can take part in several tourism activities, like hiking, observing nature and wildlife, collecting forest produce, fishing, environmental education and visiting historical monuments. Approximately 70,000 tourists visit the park each year, with July and August being the most popular months due to the climate, several cultural events around this time and the vacation period (Kevy 2011). It has to be highlighted though that since access to the park is not controlled and visitors do not have to pay an entrance fee, undertaking a visitor count is nearly impossible. Thus, the above number is very conservative, and was obtained from figures that required tourists to pay for goods or services.

Since tourists currently do not have to pay an admission fee for visiting Örség National Park, the primary objective of this study is to detect if visitors (beneficiaries) are willing to pay for accessing the park to enjoy its ecosystem services. Consequently we would like to reveal if there is a direct economic rent that is currently not captured by the park management from benefits enjoyed by recreational users.

### **Method Used**

Contingent valuation method (CVM) can capture visitors' WTP while putting monetary value on ecosystem goods and services provided by public goods, like national parks (Freeman 2003). Most of these goods and services do not have a market, thus they do not have prices that would reflect their true economic value. CVM is the only technique that is able to capture the total economic value of a non-market good, including use values and non-use values (such as bequest and existence value) alike (Turner et al.

1993). Consequently, it has been commonly used to determine the economic value of a wide spectrum of non-market goods. For example willingness to pay benefits were determined for several wildlife species (Stevens et al. 1991), for benefiting from improved water quality (Carson and Mitchell 1993), for cleaning up a hazardous waste deposit (Kaderják et al. 1997, cited by Marjaine 2000), for the conservation of ecologically and culturally important sites (Dixon 2011) and for ecosystem services provided by national parks (Getzner 2009).

While CVM has a great advantage to capture the total economic value, but just as any other valuation method, it has its weaknesses. One of these is hypothetical bias that may result in stated WTP estimates that are incorrectly higher than actual payments would be (Tietenberg 2000). Empirical evidence from the US and Western Europe indicates that an oath of honesty – a truth telling device that requires respondents to swear upon their honor to always provide honest answers – can reduce hypothetical bias (Jacquemet et al. 2010; Stevens et al. 2009).

### **Study Objectives**

The purpose of this study was to achieve the following objectives:

1. Find out if there is an economic rent currently not captured by park management due to the lack of admission fee for visitors. This means to reveal if visitors are willing to pay for Órség National Park's ecosystem services they benefit from; and contribute to nature conservation efforts.
2. Reveal the relative importance of various ecosystem services to respondents, and find out if the most preferred services determine WTP.
3. Reveal other determinants of respondents' willingness to pay.

4. Find out if the Oath of honesty can effectively work in a culturally and geographically different setting from existing studies in eliminating hypothetical bias that occurs with the use of contingent valuation method.
5. Get to know tourist profile and preferences. Thus, provide information to the national park management that they currently cannot obtain on tourists' motivation for visiting the park and the most preferred services and recreational activities.

To achieve these objectives I conducted a contingent valuation survey in Örség National Park in the summer of 2011. Tourists visiting the park were surveyed about their willingness to pay for a user fee to the park, as well as about their recreational and ecosystem service preferences. An oath of honesty was administered as part of the survey employed in this study. By signing the oath of honesty prior to answering survey questions respondents swore upon their honor to tell the truth and provide honest answers to all questions. The effect of this oath on valuation estimates provides information from a culturally and geographically different environment from previous studies.

### **Implications**

The use of the CVM model while assigning monetary value to Örség National Park will enable the park management to assess the economic feasibility of an ecosystem payment mechanism (direct rent capture) that could lead to improved funding and essentially contribute to park conservation efforts.

By incorporating an ecosystem service ranking question in the survey questionnaire more than one implication will occur. First, the park management will be able to evaluate if its ecosystem conservation priorities are in accordance with visitor



preferences. Second, we can contribute to the CVM literature while examining if the most preferred ecosystem services determine willingness to pay for park protection.

With regards to the Oath of honesty employed by this study we can not only further increase the number of CVM studies this truth telling device is tested in, but we can also either confirm or reject its effect in a culturally and geographically different environment.

Our study will also increase the limited number of CVM studies carried out in Hungary and last but not least will provide the most needed information on visitor profile and preference to Örség National Park management.

### **Study Overview**

Chapter two of this thesis deals with a spectrum of goods and fits the ecosystem goods into categories. It then provides a detailed review on the contingent valuation method that is used in this study. Chapter three explains the data collection method, introduces the sample and plans for data analysis. Chapter four presents survey results for valuation, ecosystem services and visitor characteristics, and it also deals with the OLS regression model. Chapter five summarizes the major findings and policy implications of the study, and lists the limitations and future research needs.

## **CHAPTER II**

### **LITERATURE REVIEW**

#### **Ecosystem Services**

Ecosystem services are goods and services provided by ecosystems. They play an important role in the survival of humans since people obtain several benefits from their existence. The Millennium Ecosystem Assessment (2005) provides the following categorization of these services:

- Provisioning Services, such as food, fiber, genetic resources and fresh water.
- Regulating Services like climate, water and erosion regulation, pollination.
- Cultural Services, such as educational values, cultural heritage values and recreation.
- Supporting Services like soil formation, primary production, nutrient and water cycling.

Due to the degradation and overexploitation of biodiversity and ecosystems, these goods and services are becoming more and more scarce. Since these services greatly benefit the human population, any change in their quality or quantity will also affect human welfare. This effect can occur as a decrease in benefits or increase in costs. To be able to quantify these benefits and costs and to get a better picture of the values of the different ecosystems, there is a need to assign monetary value to the goods and services that they provide. Quantifying these values will also allow us to assign payment mechanisms to the ecosystem services that can provide a solution to financial problems.

Many of the ecosystem goods such as timber, food and fuel get traded on established markets. This means they have agreed market prices, consequently well defined values. But ecosystems through their existence also provide valuable services – like water cycling, pollination and recreation – that though are necessary for human survival, do not appear on markets and have no assigned monetary values.

Table 1, adapted from Turner, Pearce and Bateman (1994) and cited by Marjaine (2000) shows a summary and description of the type of goods society uses and consumes. It also shows the prospects for monetary valuation.

**Table 1: Spectrum of goods and their monetary valuation**

	Spectrum of goods			
	Pure private goods	Quasi-private goods	Quasi-public goods	Pure public goods
Characteristics	Exclusive, divisible	Non-exclusive, divisible	Non-exclusive, only partially divisible	Non-exclusive, indivisible
	Rivalness in consumption, exclusion easy	Annual or regular payments made to provide goods	Congestible goods which become more like private goods once carrying capacity is reached and they become to full	Non-rivalness in consumption, exclusion not possible or practicable
Prospects for monetary valuation	Good: private goods bought and sold on markets, market price value available	Less good: no markets present, some indirect methods developed to substitute for unavailable market private values		Least good: substitute valuation methods face difficult constraints
	Environmental goods and services			

(Turner et al. 1994, 78)

As this table shows, environmental goods and services can be grouped into all four categories. When they appear as private goods (e.g. timber, fuel) and get sold on existing markets then their market prices represent their monetary value. In case of those goods that have no markets and consequently no prices indirect valuation methods can provide a solution. Assigning monetary values to these goods is important and relevant for responsible policy making, or as the MA says: “Better quantification of the benefits derived from ecosystems would provide greater impetus for biodiversity protection and create a more transparent picture of the equitability of the distribution of benefits” (MA 2005, 38).

### **Total Economic Value**

It is important to define the total economic value of a good to fully understand the different fraction values that valuation methods can reveal. Turner et al. (1993) breaks up total economic value into use value and non-use value. Use value is the qualitative aspect of value, which is divided up between direct use value, indirect use value, option value and bequest value. Non-use value (sometimes called passive use value) is the value an individual assigns to a good or service, which they might not use. Non-use value can be broken down into two categories, bequest value and existence value. Thus, bequest value can represent both use and non-use value.

The values under use value all are directly derived from individual use of the good or service. Direct use value represents a value that is gained from the actual use of and environmental good or service. Option value looks at the potential future benefits a good or service might have. Bequest value is the value individuals put on goods and services knowing that future generations will be able to use them.

Existence and bequest values under the non-use value category represent benefits that are derived in ways different from the actual use of a good. As previously stated bequest value is the value individuals put on goods and services knowing that future generations will be able to use them. The reason it falls under both use value and non-use value is that for an individual at this moment it is a non-use value, but for an individual in the future it is a use value. Existence value is defined as benefits an individual receives knowing that a good or service exists even if they never plan on using the good or service.

Since most of the ecosystem good values are not expressed in monetary amounts due to the lack of tradable prices and the non market nature of these goods, several valuation techniques have been developed to express their values.

### **Economic Valuation Methods**

Mitchell and Carson (1989) distinguished the valuation techniques based on the data source, depending if the monetary value is derived from individuals' actual market behavior or from their answers given to hypothetical market scenario questions. As a result the valuation models can be grouped into *Revealed Preference* and *Stated Preference* categories.

### **Revealed Preference Methods**

The *revealed preference methods* find market goods that are directly related to the environmental good that is being valued, and reveal any price value and/or consumption changes or differences of these market goods in order to assign a monetary value to the environmental good. The most commonly used revealed preference methods are the Travel Cost, Hedonic Property Value, and Hedonic Wage Models. These methods have

the advantage of not being hypothetical, because they reveal values from the prices of related market goods that people actually pay for. At the same time they tend to underestimate the real value of an environmental good due to not taking into account the full range of use and non-use values produced by the good (Garrod and Willis 1999).

### **Stated Preference Methods**

The *stated preference methods* through a hypothetical scenario directly ask individuals about their value judgments and ask them to assign a value/preference/behavior to a change in the quality of an environmental good.

The following techniques are listed in the literature as stated preference methods:

- Contingent Valuation Method
- Contingent ranking and Choice experiment
- Contingent Behavior
- Conjoint Analysis.

Amongst these the contingent valuation method (CVM) is the most commonly known to value non-market goods. This method directly asks individuals about a value they would be willing to pay or accept as a compensation for a hypothetical change in a quality or quantity of a good. Thus, the estimated value does not come from actual payments made by individuals but from responses to a hypothetical scenario. Because survey respondents are confronted by a hypothetical market and willingness to pay (WTP) amount that they do not have to pay, their stated WTP amount often overstates the amount that they would actually pay for a good (Tietenberg 2000). This is called the hypothetical bias that can bias economic value estimates. (For a more detailed analysis of the hypothetical bias as well as other biases that can arise with the use of this method

please see page 30). At the same time this valuation technique has a great advantage and benefit, namely that it can measure all components of the total economic value.

To calculate economic rents that beneficiaries would pay for conservation requires us to value the benefits these beneficiaries receive. Consequently we need to choose a valuation technique that is most suitable for valuing benefits.

As explained earlier, National Parks and the ecosystem services they provide affect the well-being of societies. Also, these parks usually have a significant non-use value to individuals who would like to preserve them just for their existence. Consequently to capture both use and non-use values and measure the total benefits individuals receive from Órség National Park we need to work with the contingent valuation method.

CVM has been commonly used to quantify the monetary values of environmental sites while capturing stated willingness to pay estimates (Dixon, Scura, and van't Hof 1992; Marjaine 2000; Getzner 2009). Garrod and Willis (1999) also stated that “contingent valuation is required to value public goods such as wilderness and landscape preservation; biodiversity...” (126).

### **The Contingent Valuation Method**

#### **Theoretical foundations**

“Changes in environmental quality can affect individuals’ welfares through any of the following four channels: changes in the prices they pay for goods bought in markets; changes in the prices they receive for their factors of production; changes in the quantities of non-marketed goods; and changes in the risk individuals face” (Freeman III 2003, 43). Therefore to understand the foundations and the theoretical basis of the CVM it is

important to begin with a short analysis of the welfare measures<sup>3</sup> related to changes in environmental quality. Monetary measures of welfare change that can serve as theoretical foundations of environmental goods' contingent valuation were introduced by John Hicks (1943). Hicks (cited by Marjaine 2000) established four measures of consumer welfare change resulting from a change in price: compensating variation, equivalent variation, compensating surplus and equivalent surplus. Since compensating surplus and equivalent surplus changes (which require the consumed quantity to be held constant) are irrelevant in terms of public good supply, here I am only focusing on the compensating variation and equivalent variation.

The analysis that explains these two variations assumes a rationally behaving and utility-maximizing consumer who consumes two goods:  $X_1$  and  $X_2$ . Figure 3 shows these two goods with the consumer's two indifference curves. Assume  $X_2$  is a composite good with a price of unity, thus,  $X_2$  can represent income. Also assume that  $X_1$  good's price falls from  $p_1'$  to  $p_1''$  due to an environmental improvement that reduces production cost. Before the price change the individual is at consumption bundle A on  $u_0$  indifference curve, and after the price drops the individual moves to consumption bundle B to  $u_1$  indifference curve, consuming more units of  $X_1$  and less units of  $X_2$ , while holding income constant.

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<sup>3</sup> To better understand welfare measures it is worthwhile to revisit the neoclassical economics assumptions that assume that consumers are behaving rationally and individuals have choices among alternative bundles of goods. While behaving rationally individuals – based on their preferences – rank the different choices of alternative bundles of goods and choose the most preferred ones to maximize utility and achieve a higher level of welfare. The utility maximization is subject to the constraints of income and prices (Hanley and Spash 1993; Freeman III 2003).

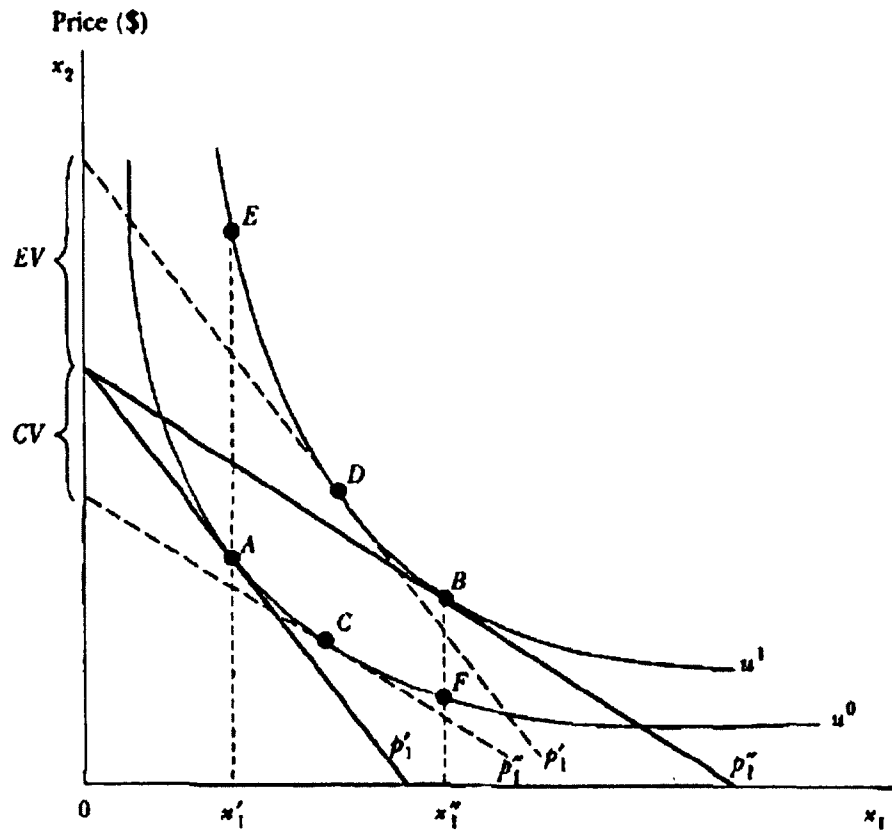


The welfare change that was caused by the price change can be defined by the variation of income. “The **compensating variation** of the price fall is the sum of money that, when taken away from the consumer, leaves him or her just as well off with the price change as if it had not occurred: that is, the change that holds the consumer at her or his initial level of utility,  $u_0$ ” (Hanley and Spash 1993, 32). This sum of money is represented by CV on Figure 3 and therefore, in consumption bundle C the consumer is just as well off as in A. In case of a price drop CV can be interpreted as the maximum amount that the consumer would be willing to pay to be able to consume at the higher utility level.

“The **equivalent variation** of a price fall is the sum of money that, when given to the consumer, leaves him or her just as well off without the price change as if it had occurred” (Hanley and Spash 1993, 33). This sum of money is represented by EV and would take the consumer to consumption bundle D on  $u_1$ . In case of a price drop EV can be interpreted as the minimum amount of money that the consumer would be willing to accept to voluntarily go without the new price set.

Even though it seems like the sum of money should be the same in both cases of variation, the two amounts usually differ. The difference occurs because in the case of compensating variation there is an income reduction while in the case of equivalent variation the income is being increased (Hanley and Spash 1993; Freeman III 2003).

**Figure 3: Measures of the welfare gain from a price decrease**



Source: Freeman III 2003, 50.

### Willingness to pay and willingness to accept

With contingent valuation it is possible to define these welfare measures, while asking individuals about their willingness to pay (WTP) or accept (WTA) of a sum of money based on a hypothetical market that describes a change in a non-market good's quality or quantity. Theoretically WTP and WTA estimates should be equal, but empirical research shows that these estimates show considerably different results, WTA exceeding WTP. Economic and psychological reasons can cause these differences since "individuals feel the cost of a loss (WTA compensation format) more intensely than the benefit of a gain (WTP format)" (Turner, Pearce and Bateman 1994, 123). Due to this

difference, critics – including the U.S. NOAA (National Oceanic and Atmospheric Administration) that provides guidelines on how to conduct CVM studies, say that WTP format gives more reliable results. Consequently they say that it should be preferred over the WTA. At the same time properly deciding if the hypothetical question will be based on WTP or WTA should always be upon examining the characteristics of the individual research area and the valuation circumstances (Marjaine 2000).

Property rights also can help us to decide if it is better to use WTP or WTA in the hypothetical research question. In the case where an individual does not own a good a WTP question would correctly measure the maximum amount that this individual would offer for his or her welfare change. But if an individual owns the property rights then the use of WTA question might be preferred to measure the compensation that the individual would need for a change in welfare due to giving up either the whole property or some rights to the property (Garrod and Willis 1999).

The nature of this research requires the use of WTP due to the following reasons:

- It aims to reveal a monetary value for the avoidance of a hypothetical decrease in the quality of the good so that the consumers could stay at the same welfare level.
- Visitors do not have the property rights.
- They receive benefits from biodiversity offered by the park that they currently do not have to pay for.

The main part of the contingent valuation method is the design of the questionnaire survey. CVM surveys usually consist of three parts. The first part is designed to get information on respondents' profile, preferences and knowledge regarding the good that is being valued, their attitudes towards environmental issues in

general and the existence of substitutes (Garrod and Willis 1999; Getzner 2009). The second part focuses on the WTP/WTB and reveals information on value preferences or reasons for zero estimates. The third part is designed to gather data on respondents' socio-economic characteristics to be able to examine the representativeness of the sample and the validity of variables influencing the bids (Garrod and Willis 1999).

**Stages of the Contingent Valuation method** (based on Hanley and Spash 1993)

**1. Set up of the hypothetical market** – this should include:

- Reasons for the payment or compensation.
- The way payments will be collected (the form of payment vehicle), which can be in the form of property taxes, income tax, payments into a trust fund or entry fees, depending on the nature of the good that is being valued,
- Who is responsible for making the payments or who is eligible for the compensation.

The description of the hypothetical market should be as realistic as possible to be able derive valid conclusions and WTP estimates. Stevens et al. (1991) while citing Harris et al. (1989) noted that reminding the respondents about other market or non-market goods' prices and income as a constraint can increase the decision-making quality and accuracy of the CVM.

**2. Obtaining of bids:** individuals can be presented with the questionnaire in the form of face-to-face interview, telephone interview, self-fill and mail survey. Since these last two often suffer from low response rates, and over the phone defining and interpreting the good may be problematic, the face-to-face interview is recommended (Hanley and Spash

1993; Arrow et al. 1993; Garrod and Willis 1999). During the interview the respondents can be asked about their WTP or WTA in several ways:

- a. Open-ended question: without specifying and suggesting any amounts individuals are asked to state their WTP for the good. Its disadvantage is that respondents may find it problematic to assign a concrete price to goods that are not traded on markets (Freeman III 2003). Therefore the NOAA report does not recommend the use of open-ended questions to assign monetary estimates to non-use or passive values (Garrod and Willis 1999).
- b. Dichotomous choice question: a single payment amount is offered for the respondents to either take it or leave it (i.e. to state if they were willing to pay that specified amount or not). The offered values randomly differ in the questionnaire across a previously concluded range. These bids have to be carefully selected based on an open-ended question format. The pilot survey has to be largely scaled to make sure that “responses are well calibrated” (Garrod and Willis 1999, 135).
- c. Iterative bidding format or series of dichotomous choice questions: starts with a dichotomous choice question and depending if the first amount is accepted or not, the individual is asked about higher or smaller amounts until the maximum willingness to pay is revealed (Garrod and Willis 1999). Its disadvantage is that it requires a lot of patience and interest in the topic from the respondent to commit the time to complete the bidding game.
- d. Payment card: a card with a series of concrete payment amounts that range from zero to an upper limit is given to respondents. They can then choose one amount that best represents their maximum willingness to pay for the good (Garrod and Willis 1999;

Freeman III 2003; Getzner 2009). While Arrow et al. (1993) in the NOAA report stated that the use of the payment card format may cause anchoring and biased results due to range bias and centering bias<sup>4</sup>, they did not support this statement with empirical studies (Rowe et al. 1996; cited by Marjaine 2000, Freeman III 2003). Rowe et al. (1996) tested for the existence of these biases while surveying residents of the metro-Denver area about their willingness to pay for a cleanup of all hazardous sites in Colorado. They used four different payment cards with varying ranges and amounts for the center. Their findings showed no significant difference for the mean WTP based on the four different payment cards as long as the payment card did not truncate the upper range values. Thus, their research did not support the appearance of range and centering bias in the payment card method.

There are several advantages to using the payment card method. The most important one is that it helps respondents to visualize the amounts that they would assign as a value to their welfare change (Garrod and Willis 1999). Second, the average willingness to pay estimates can be easily derived by the use of ordinary least square regression (Hanley and Spash 1993).

**3. Estimation of WTP or WTA:** this means averaging WTP bids stated by respondents while calculating the mean and/or median values. Garrod and Willis (1999) stated that the mean values are the most appropriate, “since in economic theory they are a cardinal measure of the utility individuals derive from the good” (139). They also acknowledged that mean values can be highly influenced by large bids (unrealistically high WTP values

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<sup>4</sup> Range bias means that the range of values presented by the payment card influences the chosen amount. Centering bias means that there is a higher probability that the centrally located amount is chosen (Rowe et al. 1996).

– outliers), thus can largely increase the average bid estimate. Median values are not affected by these outliers, but their disadvantage is that they usually underestimate the average values (i.e. individuals' utility). The literature does not offer a standardized solution on what value constitutes an outlier and on how handle them. The most commonly used technique to identify large individual bids is to compare individuals' stated WTP and income and to set a rule of thumb that would set aside all observations where WTP is X% of the income (Freeman III 2003). Freeman (2003) lists another alternative to deal with outliers. Based on Belsley et al. (1980) he recommends performing regression diagnostic procedures, and eliminating observations with extreme values that effect regression coefficients too much. The use of trimmed<sup>5</sup> or modified<sup>6</sup> estimators can also be used to reduce outliers' influence (Garrod and Willis 1999).

Besides outliers, invalid zero responses or protest zeros can also influence mean WTP estimates. Protest zeros occur when a respondent states a zero WTP even though they place a positive value on the good (Freeman III 2003). Protest zeros can be identified with follow up questions on reasons for a zero bid. More on how CVM studies have been handling invalid zero responses can be found in the upcoming bias section.

**4. Estimation of bid curves** – means the investigation of independent variables that determine the WTP/WTB estimates (dependent variable). These can be for example income, education, gender, age, environmental attitudes (Hanley and Spash 1993).

Getzner (2009) who used CVM to value the ecosystem services provided by Tatra National Park in Poland found that household income has a positive effect on

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<sup>5</sup> Trim the top and bottom 5% or 10% of the distribution of WTP observations. With this technique researches may risk the loss of true WTP estimates.

<sup>6</sup> Remove biased and/or illegitimate responses that can be identified by a series of follow up questions (Garrod and Willis 1999).

respondent's WTP (also explained by economic theory), while the availability of substitutes negatively effected it. Marjaine (2000) measured Hungarian people's willingness to pay for cave protection and found that females, environmentally conscious individuals and those who have a higher knowledge about the good being valued offered a significantly higher WTP. Her study also revealed that age has a negative effect on WTP estimates.

**5. Aggregation of the data:** based on the mean or median WTP estimate derived from the sample survey we can calculate a total value for the whole population while multiplying the sample average with the number of households/visitors. Resident population parameters can easily be obtained from national or local census data, and the survey data can be adjusted if needed to represent the real population. In contrast to this National Parks are not always able to undertake visitor counts and derive the characteristics of visitors, who can then represent the total population. This is especially true to parks with open boundaries and access, and local rural communities living within or around their areas (Garrod and Willis 1999).

**6. Evaluation of CVM's validity:** to measure how valid the WTP/WTAs estimates are, i.e. would respondents actually pay the amount that they stated (Garrod and Willis 1999)? Mitchell and Carson (1989) suggests the following in order to decide if CVM results are valid:

- Content validity: were the good that is being valued and the hypothetical market described in good details, emphatically and realistically? Was the right payment method (WTP/WTAs) chosen? Were substitutes for the valued good taken into



consideration and were respondents reminded about their budget constraint? If embedding<sup>7</sup> could occur during valuation was it addressed?

- Criterion validity: are the hypothetical payments similar to actual payments or values derived from actual market behavior?
- Construct validity (convergent and theoretical): are results on explanatory variables consistent with variables previous research found and with theory? (Garrod and Willis 1999).

### **Biases in the Contingent Valuation Method**

The contingent valuation method can suffer from several biases that can weaken the reliability of WTP estimates. Therefore it is crucial to design the CVM questionnaire and hypothetical market in a way that biases are be minimized. Some of the biases that can be significant in the case of this study are detailed below.

**Strategic bias** occurs due to respondents' strategic behavior. This means that respondents either understate their actual WTP in case they believe that the proposed market change will be implemented (free rider problem) or overstate their real WTP if they find the market to be purely hypothetical. A realistic contingent market design as well as the incorporation of certainty scale can help to avoid strategic bias (Champ and Bishop 2001).

**Starting point bias** may occur with the use of iterative bidding and payment card method when results are affected by a starting bid that was set by the researcher. Consequently, conducting a pretest with an open ended WTP question can be essential in eliminating this type of bias.

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<sup>7</sup> Explained in the next section.

**Payment vehicle bias** influences WTP results when the method of the hypothetical payment creates a dislike, thus respondents would refuse to pay. To avoid this bias “the payment vehicle chosen in a CV study should be that which most closely resembles how the money would be actually raised” (Garrod and Willis 1999, 157).

**Information bias** can alter results when the description of the hypothetical market includes too little or too much and/or non-objective information about the good that is being valued. Blomquist and Whitehead (1998) who tested the information effect on WTP estimates found that changes in information about the resource quality can determine WTP. Thus, their research shows “that information presented in contingent markets can be used to increase the theoretical validity of WTP” (Blomquist and Whitehead 1998, 192).

**Protest bias** is caused by protest bids and outliers. Protest bids are those zero WTP values that are given by respondents who value the given environmental good, but refuse to place a monetary value on it due to ethical or other reasons, that are different from bad financial circumstances. This way these zero WTP values are different from legitimate zero bids and they are considered protest zero bids. The protest zero bids can be identified with follow-up questions that allow the respondents to explain why they answered zero to the WTP question.

Halstead, Luloff and Stevens (1992) summarized how CV studies have treated protest zero bids. They found that researchers either:

- Leave them out from the analysis (most often used procedure).

- Assign the sample's mean WTP estimate to the zero protest bids, if the sociodemographic characteristics of the protest bidders are similar to the rest of the sample.
- Include them in the calculations as legitimate zero bids. They quote McGuirk, Stephenson, and Taylor (1989), who have argued that zero protest bids “should be considered legitimate WTP bids as respondents are essentially valuing a proposed policy, not just a commodity” (Halstead et al. 1992, 162). They also cite Randall (1986), who notes that stated WTP values do not only reflect the value of a public good, but the method it is provided and paid for. Thus, the valuation of an environmental good and the offered public policy cannot be separated. They take this argument further and add that “protest bids may occur when distaste for the means of provision or payment offsets personal valuation of the good” (Halstead et al. 1992, 162). Halstead et al. (1992) also tested if protest bidders sociodemographically differed from non-protest bidders, but findings did not show significant differences between the two groups.

Outliers or unrealistically high WTP estimates can also cause protest bias. Techniques that can eliminate their influence are discussed in the Stages of CVM section.

**Warm glow effect** is a problem associated with a moral satisfaction or good feeling by respondents if they can contribute to a noble cause. This can also result in biased WTP compared to real WTP or actual donations (Kahneman and Knetsch 1992). Nunes and Schokkaert (2003) tested the warm glow effect while measuring WTP in Alentejo Natural Park in Portugal. They calculated “cold” WTP estimates – estimates that are free from the warm glow effect – which they compared to original WTP amounts.

The cold estimates ended up being lower than the average original stated amounts, thus their findings confirm that the warm glow effect is responsible for higher stated WTP estimates. To reduce the warm glow effect the U.S. NOAA recommends minimizing the hypothetical character of the designed market as much as possible.

**Embedding** refers to a problem when respondents cannot differentiate between a specific good and a bigger, more inclusive good; consequently they assign similar WTP values to these two (Kahneman and Knetsch 1992). “Embedding is also implied when WTP values for different quantities of the same good are approximately the same...” (Garrod and Willis 1999, 163). Careful questionnaire design and clear differentiation between the whole and portion of the valued good can minimize biased WTP estimates caused by embedding (Arrow et al. 1993).

**Hypothetical bias** occurs because survey respondents are confronted by a hypothetical market and willingness to pay amount that they do not have to pay. As a result their stated WTP amount often overstates the amount that they would actually pay for a good (Tietenberg 2000). The NOAA also states that WTP amounts estimated by CVM are often unreasonably large (Arrow et al. 1993).

Several CVM studies have been carried out to address the problem of hypothetical bias and to test methods to eliminate it. One method for this is the incorporation of respondents’ level of uncertainty on stated WTP estimates in the calculations. This means to ask respondents about their degree of certainty on actually paying the chosen amount.

Champ et al. (1997) tested how incorporating the respondents’ level of uncertainty (on a level of 0 to 10) would affect WTP estimates for an environmental good in the Grand Canyon National Park. They collected voluntary contributions and set the

value of these contributions as a “theoretical lower bound”. They found that WTP of respondents who were 100 percent sure (level of 10) of making their payment was similar to actual donated amounts. Their findings also show that not incorporating the level of uncertainty into the model (considering all WTP with a certainty level of 10) would result in a five times higher stated WTP than the actual average payments.

Halstead et al. (2002) found that yes responses on willing to pay \$x for an improved visibility in the White Mountain National Forest decreases as respondents’ certainty about actually making the payment increases. The biggest decrease appeared in between the certainty level of 7 and 8. They modified median WTP bids with respondents’ degree of uncertainty and found that the median WTP value dropped with increased uncertainty level. The biggest drop also occurred around the uncertainty level of 7.

Champ and Bishop (2001) who measured WTP estimates and collected voluntarily donations for the provision of a public good also found that the WTP estimates were the closest to actual donations at the uncertainty level of 8. Thus, the incorporation of respondents’ level of uncertainty on stated WTP estimates is proven to be effective in reducing hypothetical bias, though the exact cut-off is variable.

Another method that may offer the solution to eliminate hypothetical bias is based on social psychology (Jacquemet et al. 2009). This explains that hypothetical bias exists because of a lack of commitment to tell the truth. Jacquemet et al. (2010) re-emphasize the significance of the solemn oath as a tool that encourages commitment to truth telling. Jacquemet et al. (2009; 2010) tested the solemn oath’s effect on truth telling in the CVM in two experimental environments at the University Paris in France.

The first experiment allowed them to test if this “time-tested mechanism” could induce a more sincere bidding behavior in a valuation treatment. Bidders had to value dolphin protection in an induced value second-price auction experiment and a homegrown value second-price auction experiment. They implemented a four-treatment design in the induced value auction: 1. baseline hypothetical bidding without oath or monetary incentives, 2. baseline coupled with an oath, 3. bidding with binding monetary incentives (real), and 4. an oath coupled with monetary incentives. Those respondents who participated in the oath treatment voluntarily signed a solemn oath that said: “I, the undersigned swear upon my honor that during the entire experiment, I will tell the truth and always provide honest answers.”

Since in the induced value auction the oath and monetary incentives combination resulted in the less sincere bidding, they left this treatment out from the homegrown value auctions and only tested the remaining three treatments: 1. hypothetical bids, 2. monetary-incentives bids, and 3. oath-only bidding.

In both auctions the oath-only treatment led to a more sincere bidding behavior. Their results also show that monetary incentives did not promote respondents to bid more sincerely. Thus, they found that external incentives are not as useful in reducing hypothetical bias as a commitment device such as the oath.

In another experiment, in both a real and hypothetical situation they asked participants to vote with a ‘Yes’ or ‘No’ about donating towards a public good, which was a wind energy technology. In the real situation participants were endowed with \$15 and they had the opportunity to either donate or not donate this amount towards the public good. In the hypothetical situation respondents were asked to imagine the same

situation and state if they would or would not donate the amount. 40 percent of the respondents in the hypothetical scenario were asked to voluntarily sign an “Oath” to tell the truth. They found that those respondents who signed the oath in the hypothetical scenario behaved in the same way as those who were participating in the real scenario. Their ‘Yes’ responses to donate the money towards the public good was less frequent than the responses of those who did not sign the oath in the hypothetical treatment. Thus, their experimental findings showed that the Oath could promote commitment to telling the truth and eliminated hypothetical bias.

Stevens et al. (2009) also tested the use of oath for eliminating hypothetical bias in a treatment experiment. Respondents (students at the University of Massachusetts) were asked about their contribution to a non-profit humanitarian organization. Participants in Treatments 1 and 2 first had to vote on a hypothetical contribution, then on an actual payment. Participants in Treatment 3 were only asked to vote on an actual contribution. Respondents in Treatment 2 were asked to voluntarily sign the oath. Hypothetical bias was measured as a difference between hypothetical and actual payments. Hypothetical bias was much smaller in Treatment 2 than in Treatment 1. They also found that mean hypothetical bias was significantly bigger in Treatment 1 than in Treatment 2. Thus, their results show that signing the oath effectively reduced hypothetical bias. With this they further confirmed Jacquemet et al.’s findings about the oath’s effect in effective hypothetical bias elimination.

However results from both Jacquemet et al.’s and Stevens et al.’s experiment show that the Oath is an effective tool to eliminate hypothetical bias, there is a need for additional research in a variety of circumstances and cultural settings. Their studies – just

like many other hypothetical bias studies – have been conducted in the United States and Western Europe. The problem with this is that hypothetical bias may vary with culture (Ehmke et al. 2008). Ehmke et al. (2008) compared hypothetical and real votes given by University students in China, Niger, France, and the US (Kansas and Indiana). They found that hypothetical bias was significantly different in all four countries. It was the biggest in the US and the smallest in Niger. The results from Niger were surprising, since Nigerian students even understated their hypothetical willingness to pay. Their findings also show that behavior differences that are rooted in the different cultures are responsible for the variances in hypothetical bias. Stevens et al. (2009) also found that hypothetical bias varies across cultures, while showing that Asian respondents have a significantly higher level of hypothetical bias.

Consequently, cultural values may explain the type and degree of hypothetical bias, and therefore can also alter the effects of Oath in reducing hypothetical bias. Due to the geographic and cultural limitation of the Oath's result in the literature we do not know if this could be the case.



## CHAPTER III

### METHODS

#### **The Survey and the Hypothetical Market**

To detect the visitors' willingness to pay for Órség National Park's ecosystem services we designed a contingent valuation questionnaire based on the CVM literature, on previous CVM surveys (Getzner 2009; Gilbert 1994) and with the help of the conservation manager and tourism manager of the park. Their insight and knowledge about the provided ecosystem services, conservation programs, park purposes and characteristics, visitation patterns, possible tourism activities and financial resources were indispensable in the survey design. Park managers' collaboration was also necessary for the formation of a realistic and credible WTP question so that the information effect would have as little influence on the WTP estimates as possible.

The author of this thesis pre-tested the preliminary version of the questionnaire amongst members of a Hungarian community in Boston. With this test we aimed to examine if questions were understandable, if they were listed in a clear and logical order and if the program that was described in the willingness to pay question sounded acceptable and realistic to respondents. Based on the responses minor compositional changes were made.

*Valuation* was estimated via a standard payment card method for an annual pass for resident recreational users and a daily user fee for visitors, payable in Hungarian

Forint. This distinction was made to be able to most realistically capture the willingness to pay of both tourists and residents. Tourists could not be expected to pay an annual amount considering the fact that they may only visit the park once a year or even a lifetime. At the same time residents could not be expected to pay for a user fee each day they enjoy the park for recreational uses.

The values for the annual pass were generated from a CVM questionnaire that was used to value Tatra National Park in Poland, which is an economically similar environment to Hungary. These values were previously pretested and successfully used amongst mostly Polish tourists to reveal their willingness to pay for conservation.

To determine the payment bid values of the daily use fee, I administered a pretest with an open ended WTP question to 12 tourists visiting the park on the 20<sup>th</sup> of July, at one of the most popular locations of Órség National Park. With the pretest we also aimed to capture the extreme ends of the payment values and to avoid starting point bias (Tietenberg 2000). Based on the results of the pretest the following payment card values (all in Hungarian Forint) were selected for the final questionnaire for daily user fee: 0, 200, 500, 1000, 1500, 2000 and 4000. Copies of the questionnaires are included in Appendix A.

The assumption in the WTP question that said that the government stopped funding conservation programs is very realistic considering the recent budget constraints the Hungarian government is currently implementing. Thus, choosing a user fee as a vehicle for making the payment to help finance the park is credible on one hand and also realistic on the other hand considering that currently visitors do not have to pay an admission fee. Choosing the user fee as a payment vehicle also helped us to avoid the

problem of free riding that could occur with a donations vehicle with a better chance when a respondent refuses to pay, but believes that everyone else does so that the commodity can be preserved. Proposing an additional tax as a payment vehicle could have caused an unrealistically high refusal rate and/or protest bids due to already high tax rates in Hungary. Consequently this type of payment vehicle was not considered.

*Ecosystem services valued by tourists:* After careful consultation with park management to cover all significant ecosystem services provided by the park, and to represent a cross section of provisioning, regulating and cultural services the following ecosystem services were listed in the survey:

- Provision of water supply and quality
- Timber products
- Food provided by nature (e.g. honey, mushrooms, berries)
- Herbs
- Air quality regulation and carbon sequestration (climate regulation)
- Erosion control
- Fishing and hunting
- Pollination
- Recreation/tourism
- Environmental education
- Maintenance of cultural traditions
- Local natural food: cheese, pumpkin-seed oil.

Respondents were asked to rank the top three most important services. Statistical analysis helped us reveal what percentage of respondents chose a given ecosystem

service for either first, second or third most important services. Each service was also analyzed in terms of what percentage of respondents chose it for any of these three importance categories.

*Motivation for a positive WTP and for zero bids:* To reveal both tourists' motivation for positive willingness to pay and reasons for zero bids a question along with multiple choice answers was placed directly after the WTP question. In the case of positive bids respondents had to rank their motivation as if they had 100 points, and distribute these points amongst alternatives that represent the use, option, existence and bequest value of the park. In the case of zero bids the follow up question helped us identify possible protest bids (Halstead, Luloff, and Stevens 1992).

*Visitor characteristics:* Respondents were asked several questions to be able to get to know their socio-economic characteristics, profile, recreational preferences, and main motivation for visitation, local area spending and opinions on park funding.

### **The Sample and Data Collection**

The final survey was administered in July and August of 2011. These two months were chosen because this is the time period when the park gets the most visitors (Kevy 2011). Due to limited financial resources only 22 days (13 days in mid and late July and nine days in early August) were allocated to complete the survey process, which meant personally recruiting and interviewing visitors who were over the age of 18 at different locations in Órség National Park. In order to encompass a broad geographic distribution within the park, as well as a wide range of tourist characteristics, surveying took place at the following twelve different park locations:

- Visitor Center and Harmatfű Conservation Center in Óriszentpéter

- Pityerszer Village Museum in Szalafő
- Őrségi TeleHouse in Őriszentpéter
- Hegyhátszentjakab Camping and lake – recreational area
- In Nagyrákos after a guided bike ride tour
- Biofarm in Kercaszomor
- Culture porter's lodge in Viszák
- Protected church site in Őriszentpéter and Velemér
- In Apátistvánfalva during a guided butterfly hike
- Hársas lake – recreational area.

During the surveying period 226 recreational users were randomly selected and asked to participate in the study. Only five of them refused to be interviewed, thus the size of the random sample of respondents was 221. Though this study also intended to reveal the year round and seasonal residents' preferences and WTP, only nine residents were intercepted for the random sample, so we decided to omit them from the analysis and further investigation. Consequently the random sample size of visitors<sup>8</sup> decreased to 212.

To be able to incorporate the Oath's effect on reducing hypothetical bias, approximately half of the respondents were asked to sign an Oath of honesty prior to filling out the survey. By signing the Oath of honesty respondents swear upon their honor that, during the whole experiment, they would tell the truth and always provide honest answers. A copy of the Oath of honesty is included in Appendix B.

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<sup>8</sup> In this study Őrség National Park visitor refers to those recreational users who are not residents of the park. The definition of visitor and tourist may be used interchangeably in the study, but will only be referred to non-residents.

Only seven tourists who were presented with the oath refused to sign it, but they still answered the survey questions. Since these tourists were not documented we make the assumption that they acted and answered the survey questions in the same way as those who were not presented with the oath at all.

To complete the survey took an average of 19 minutes, ranging from 12 to 40 minutes. At the end of the surveying period I had attained two approximately equal sub-samples:

- a sample of 107 visitors who were not presented with the Oath of honesty prior to filling out the survey,
- a sample of 105 visitors who were presented with and signed the Oath of honesty prior to filling out the questionnaire.

#### **Survey Structure and Plan for Data Analysis**

Survey questions were intended to

- Be converted into relevant independent variables to explain and determine willingness to pay for the park's ecosystem services (dependent variable) using a multiple regression model.
- Reveal the motivation for a positive WTP (use values vs. non-use values).
- Identify reasons for zero WTP.
- Discover the ecosystem services the tourists value the most.
- Reveal visitor characteristics and visitation patterns.

Furthermore, we sought to examine the Oath's effect in reducing hypothetical bias.

Using the dataset created from survey results we aimed to quantify the use and non-use values of the park while valuing its ecosystem services, as well as examining the

feasibility of a payment mechanism that could ease budgetary problems. To achieve this goal means to find out if there is an economic rent that is not captured by park management, since currently there is no admission fee for visitors. To expand the literature on contingent valuation the following hypotheses will be tested:

1. There is an economic rent (direct rent capture – a variation on payment for ecosystem services) that is currently not captured by Órség National Park management.
2. The Oath of honesty influences the results of the WTP amount, i.e. the WTP amount differs depending on if a respondent signed the Oath of honesty or not. Signing the Oath of honesty results in a smaller WTP amount.

*As an exploratory endeavor, we also test the following hypotheses:*

3. The duration of stay influences visitors' WTP. Longer duration of stay results in a smaller WTP for the daily user fee.
4. Attitudes towards park protection influence visitors' WTP. Expected relationship between WTP and park protection attitude variables can be seen in Table 2.
5. Highly ranked ecosystem services can determine visitors' WTP.

#### **Willingness To Pay for Ecosystem Services as a Function of Independent variables**

Findings from studies cited in the literature review gave the basis of specifying the independent variables of this study. Thus, questions that were converted into independent variables were formed based on previous CVM studies that found significant relationship between willingness to pay for an environmental commodity and the respondents'

- Various socio-economic characteristics, including gender, age (Marjaine 2000) and household income (Getzner 2010).

- Attitudes toward nature and/or environmental protection (Marjaine 2000), including membership and contribution to environmental organizations.
- Knowledge about the commodity (Marjaine 2000 and Getzner 2010).
- Willingness to sign the oath of honesty (Jacquemet et al. 2009, 2010; Stevens et al. 2009).
- Level of certainty in payment (Champ and Bishop 2001).
- Ability/willingness of substitution for the good (Garrod and Willis's 1999).

Since the vehicle for payment was specified in a daily user fee, duration of intended stay was collected as well. Duration of stay is also expected to influence WTP.

Table 2 shows the expected relationship between all the independent variables and WTP for ecosystem services (dependent variable).



**Table 2: Expected relationship between WTP and possible predicting variables**

<i>Relationship between WTP for the park's ecosystem services and:</i>	<i>Expected Sign:</i>
- Oath of honesty	- Lower WTP for those who signed the Oath
- Gender - Age - Income	- Females have higher WTP - Negative - Positive
- Strong personal obligation to protection - More measures to protect wildlife and habitat - If park was not accessible visitor could not obtain similar experience elsewhere - Each visitor should take part in covering the cost of tourism	- Positive - Positive - Positive (Higher WTP for those who would not substitute park) - Positive
- Member in environmental organization or donates for conservation	- Higher WTP for those who are members or donate
- Knowledge about park's purposes	- Higher WTP for those who has knowledge
- Duration of stay	- Negative

### **Data Analysis Procedures**

Data from the completed surveys was entered into STATA<sup>®</sup> so that appropriate statistical analyses could be conducted. These analyses included both descriptive statistics and multivariate regression analysis which allowed us to

- Discover visitor characteristics and preferences.

- Reveal visitation patterns.
- Calculate tourists' mean, median and aggregated WTP for ecosystem services.
- Estimate each of the independent variables' as well as the highly preferred ecosystem services' effect on the willingness to pay.

Because WTP, which is the dependent variable was estimated with the payment card method we utilized multiple linear regression to find out if an independent variable or ecosystem service significantly determines visitors' WTP.

Outcomes and results from the statistical analyses are presented in the following section of the thesis.

## **CHAPTER IV**

### **RESULTS**

#### **Survey Results**

During the surveying period 217 visitor recreational users were approached and asked to participate in the study. Only five of them refused to take part in the research, the response rate is therefore 97.7%. No one refused to answer the WTP question, and there was limited per item non-response. These, as well as the “I don’t know” responses were treated as missing values during analyses.

#### **Valuation and Willingness To Pay Measures**

##### **Setting the Bids for the Payment Card**

Payment bids used in the final questionnaire were based on a pretest with an open ended WTP question. Twelve visitors were included in the random pretest sample. These visitors were asked to state a maximum amount that they would be willing to pay for a daily user fee in the park. These stated amounts as well as their frequency can be seen in Table 3.

**Table 3: Frequency table for pretest bids**

<b>Bid (in HUF)</b>	<b>Frequency</b>
200	2
500	3
1000	1
1500	1
2000	3
3000	1
5000	1

The pretest's mean willingness to pay resulted in 1,533 HUF and its median is 1,250 HUF. Based on the results of the pretest I selected the following payment card values (in Hungarian Forint) to put into the final questionnaire for daily user fee: 200, 500, 1000, 1500, 2000 and 4000.

### **Estimation of the WTP**

#### **Treating Outliers**

*Zero willingness to pay bids:* Amongst the 212 tourists who were interviewed, 29 of them chose the 0 amount as their willingness to pay for daily fee. In the survey they were offered six explanations to choose from why they stated 0. With this we could judge if the 0s are valid or protest bids in terms of valuing the park's ecosystem services. Valid 0 would be if the respondent chose: "Protection of the park is not important to me". Answers to follow up questions revealed that none of the 29 tourists chose this, but 23 of them stated: "I think protection efforts should be funded through sources other than private payments" (payment vehicle protester), three of them refused to place a financial

value on park protection (ethical protester), and three of them chose: “I cannot afford to pay any additional amount of money”. All three categories represent respondents who even though they stated zero WTP, value the park and its resources. The first two categories are classified as protest responses. Responses in the last category have to be considered as valid zero offers since in CVM the stated WTP is a determinant of income.

Even though literature classifies the zero bids of the other two categories as protest responses in the case of this study we decided to treat them as legitimate zero values due to the following reasons:

- The primary goal of this study is not only to obtain a value of the Órség National Park, but also to find out if there is an economic rent that is currently not captured by park management from recreational uses. Therefore our study is also proposing a change in policy while considering the realization of an admission fee.
- Motivation of respondents who stated that they refuse to place a financial value on park protection can be explained with the theory that their personal valuation of the park was offset by their dislike for the payment method.
- Majority of the zero bidders expressed zero protest bids because they did not agree with the private payment method. Based on the literature that says that respondents also value the method of payment, we have to conclude that not including these zero values in the calculations would bias the results (McGuirk, Stephenson and Taylor 1989; cited by Halstead et al. 1992).

*Too high WTP estimates:* Amongst the 183 respondents who stated a positive WTP there was only one who chose the highest bid, the 4000 HUF value. Since this one

outlier created a significant positive skewness in the dataset, their observation was dropped. Consequently WTP > 0 decreased to 182 and sample size decreased to 211.

WTP results based on Final payment card bids.

Final WTP results can be seen in Table 4.

**Table 4: WTP results**

Category	Value
Zero WTP	29
Protest zero WTP	26
WTP > 0	182
Minimum WTP	200 HUF
Maximum WTP (after modification)	2000 HUF
Mean WTP (including all zero bids) <sup>9</sup>	655 HUF
Standard deviation	559 HUF
Median WTP	500 HUF
Sample size	211

Handling all zero bids as legitimate zeros the mean willingness to pay for the daily user fee resulted in 655 HUF. The median is a little lower with 500 HUF. Considering that in the Hungarian population the average monthly net household income per person is 78,283 HUF (KSH), we can conclude that an average Őrség National Park visitor would offer 1% of his or her monthly net income for protecting the park's ecosystems and using it for recreational purposes.

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<sup>9</sup> When excluding the protest zero bids from the calculations the mean WTP results in 747 HUF, and median stays 500 HUF. (Sample size = 185).

The final distribution of visitors' willingness to pay is showed in Figure 4.

**Figure 4: Distribution of respondents' willingness to pay for ecosystem services**

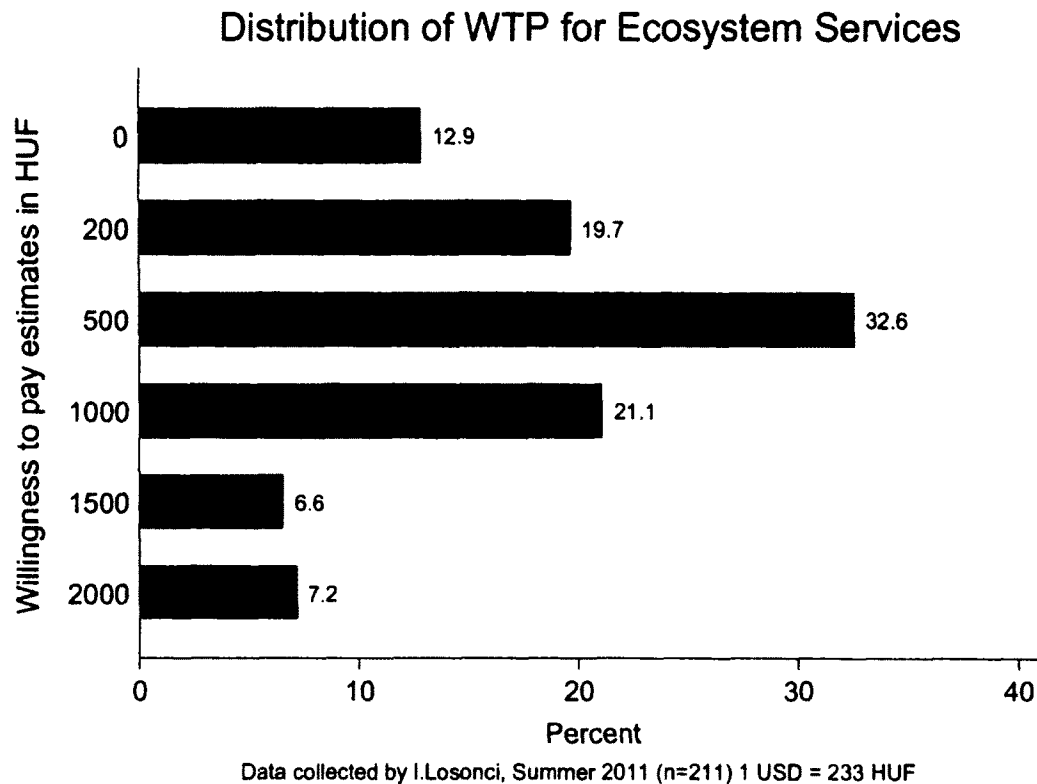


Table 5 also shows the distribution of chosen WTP by tourists in the whole sample and in each sub-sample. The Pearson chi-square test shows no significant difference between mean willingness to pay with the Oath (696 HUF) and without the Oath (614 HUF). This is not consistent with previous CVM studies and might be caused by the fact that visitors who did not sign the Oath chose the zero willingness to pay more than twice as often as visitors who signed it. The effect of the oath has to be examined with multivariate analysis to be able to draw valid conclusions.

**Table 5: Distribution of chosen WTP by tourists representing each sub-sample**

	<b>Willingness to pay for daily user fee in HUF</b>						
	0	200	500	1,000	1,500	2,000	Total
<i>No oath sub-sample</i>	17.9%	23.7%	27.4%	16.3%	5.3%	9.4%	100%
<i>Oath sub-sample</i>	7.8%	15.6%	37.9%	25.9%	7.9%	4.9%	100%
<i>Whole sample</i>	12.9%	19.7%	32.6%	21%	6.6%	7.2%	100%

### **Reasons for Positive WTP**

To reveal why tourists would be willing to pay a positive amount for a daily user fee that would support park protection we analyzed their answers for the multiple choice question that was placed directly after the WTP question. With this question we also aimed to find out if the value that they place to the existence of the park is due to their use or non-use benefits.

Table 6 shows the total distribution of use (use, option and bequest value) and non-use values (bequest and existence value) ranked by visitors (Turner et al. 1993).



**Table 6: Distribution of use and non-use values**

<b>Category</b>	<b>Motivation for positive willingness to pay</b>	<b>Distribution of values in points</b>	<b>Distribution of values in percentage</b>
<b>Use value</b>	Visitors would like to keep the area protected so that they can enjoy it and obtain the same visitor experience any time	4,954	27.22
<b>Option value</b>	Visitors might benefit from nature and wildlife protection in the future	1,733	9.52
<b>Bequest value</b>	The park should exist and stay protected for future generations	6,120	33.63
<b>Existence value</b>	Nature and wildlife have a right to exist, and the existence of the park is important to me	5,393	29.63
<b>Total</b>		18,200	100

The most highly ranked value is the bequest value with 33.63%. This shows that visitors would mostly be willing to pay for park protection so that future generations can also benefit from its existence. This result is consistent with a study that analyzed motivations for cave protection in Hungary, and found that 40% of respondents would be willing to pay for cave conservation as protection of the resource for future generations (Marjaine 2000). The second highest ranked value is existence value, and the third is use value. The option value shows a very low result compared to the other three categories. We have to notice though that all three highly ranked value categories are close to each other, especially the use and existence value. This could be explained by the fact that all visitors who were interviewed were actually using the park, but also demonstrates that even though they may not return they would like to see it protected.

### **Preferred Ecosystem Services**

Respondents were asked to choose and rank those three ecosystem services provided by the park that are the most important to them, starting with 1 as most important. Table 7 summarizes the services they could choose from and their rankings in percentages. Thus, numbers in the table represent the percentage of respondents who ranked a given service into the different importance categories (1, 2 or 3). Numbers in the total column represent the percentage of respondents who ranked a given ecosystem service into any importance category from 1 to 3.

**Table 7: Ecosystem services ranked by tourists (in percentage)**

<b>Ecosystem service</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>Total</b>	<b>Type of service</b>
Cultural traditions	18	<u>21</u>	17	<b>56</b>	Cultural
Local natural food	4	13	<u>24</u>	<b>41</b>	Provisioning
Climate regulation	<u>22</u>	14	5	<b>41</b>	Regulating
Recreation	18	10	10	<b>38</b>	Cultural
Food provided by nature	10	11	12	33	Provisioning
Water supply and quality	14	11	4	29	Provisioning
Environmental education	7	8	8	23	Cultural
Herbs	1	4	7	12	Provisioning
Timber	3	3	5	11	Provisioning
Fishing/hunting	1	1	5	7	Provisioning
Erosion	1	3	1	5	Regulating
Pollination	0	1	1	2	Regulating

We can conclude that climate regulation was voted as the most important ecosystem service (1) by the most respondents (22%). Cultural traditions was voted by the most respondents (21%) as the second most important service (2), and local natural food was chosen by the most respondents (24%) as the third most important service (3). To make a final comparison amongst the ranked ecosystem services each service was

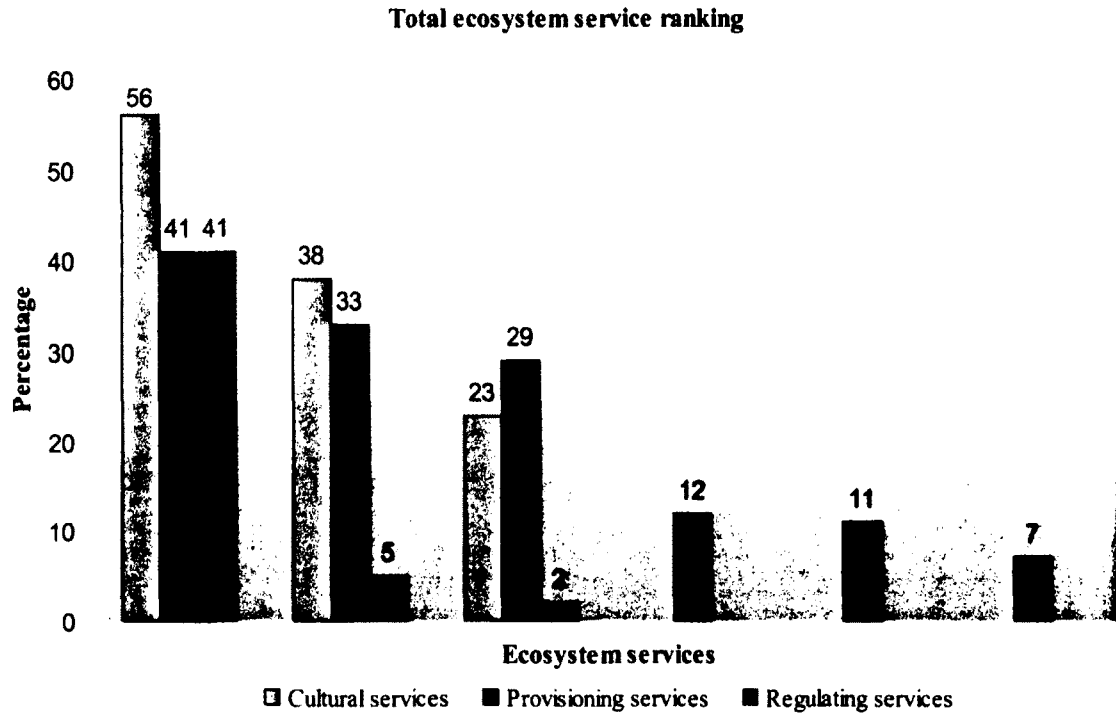
analyzed in terms of what percentage of respondents chose it as either first, second or third most important service. This is represented in the Total column.

It is important to notice that Local natural food and Climate regulation was chosen as either the first, second or third most important service (Total) by the same proportion of respondents, thus these two are both the second most voted ecosystem services, which leaves Recreation as the third one. In this sense, respondents who visited Órség National Park appreciate the following four ecosystem services the most:

1. Maintenance of cultural traditions
2. Local natural food (such as cheese and pumpkin-seed oil) and  
Air quality regulation and carbon sequestration (climate regulation)
3. Recreation

These four ecosystem services represent a combination of cultural, provisioning and regulating services, also showed by Figure 5.

**Figure 5: Most preferred ecosystem services ranked by categories**



### **Estimation of Bid Curves**

Estimation of the bid curves includes modeling the WTP (dependent variable) with the possible predicting variables (independent). To achieve this and to estimate each of the independent variables' effect on the willingness to pay estimates we utilized an ordinary least square (OLS) multiple linear regression (linear model was also used by Marjaine (2000) to estimate WTP curves for cave protection in Hungary derived by the open ended question format).

The following model is used during the analysis:

$WTP = f(\text{oath, gender, age, rincome, protect, manage, substitute, cover, green1, knowledgeQ, duration, water1, nfood1, climate1, recreation1, envedu1, tradil, lfood1})$

Table 8 shows the independent variables that are included in a multivariate analysis to determine how well they explain the variance of visitors' willingness to pay.

**Table 8: List of possible predicting variables (weighted to avoid sampling bias)**

<i>Variable name</i>	<i>Variable label</i>	<i>Variable values or categories and distribution</i>
<u>Dependent variable:</u>  <i>Daily</i>	Respondent's willingness to pay for a daily user fee, measured in Hungarian forint (HUF) 1 USD = 233 HUF (MNB).	0 (13%) 200 (20%) 500 (33%) 1,000 (21%) 1,500 (6%) 2,000 (7%)
<u>Independent variables:</u>		
<i>Oath</i>	Respondent signed the Oath of honesty or not	1 – signed it (50%) 0 – did not sing it (50%)
<i>Gender</i>	Sex of respondent	0 – female (49%) 1 – male (51%)
<i>Age</i>	Age of respondent, measured in years	18 – 70 mean: 40 median: 39
<i>Rincome</i>	Respondent's monthly total net household income, measured in HUF	<50,000 (0.2%) 50,001-100,000 (2.8%) 100,001-150,000 (9%) 150,001-250,000 (25%) 250,001-350,000 (28%) 350,001-450,000 (13%) 450,001-550,000 (8%) 550,001 HUF < (14%)
	<b><i>Park protection attitude variables:</i></b> The extent to which a respondent agrees or disagrees with the following statements:	1 = not at all 5 = totally agree
<i>Protect</i>	I feel a strong personal obligation to protect wildlife and habitat	2 (2%) 3 (18%) 4 (35%) 5 (45%)
<i>Manage</i>	More measures are needed to protect wildlife and habitat in the park	1 (16%) 2 (23%) 3 (43%) 4 (14%) 5 (4%)
<i>Substitute</i>	If the park was not accessible I would not be able to obtain similar experience elsewhere	1 (15%) 2 (11%) 3 (19%) 4 (19%) 5 (36%)

<i>Cover</i>	Each visitor should take part in covering the cost of tourism	1 (27%) 2 (14%) 3 (26%) 4 (18%) 5 (15%)
<i>Green1</i>	Respondent has either a membership in a conservation organization and/or donates for conservation purposes	1 – member and/or donates (28%) 0 – neither (72%)
<i>KnowledgeQ</i>	Respondent is knowledgeable about park purpose or not	1 – (s)he knows (75%) 0 – doesn't know (25%)
<i>Duration</i>	Length visitors stay in the park, measured in days	1 – 14 mean: 4.7 median: 5
<i>Ecosystem Services</i>	Most preferred ecosystem services chosen by a high percentage of respondents	0 – service not chosen 1 – service chosen as important

Besides variable *green1*, *knowledgeQ* and *daily* all variables are presented as they were derived from survey results. To improve analysis we slightly modified the original variables for *green1*, *knowledgeQ* and *daily* in the following ways:

- Membership in a conservation organization and donating for environmental purposes were asked in separate questions. Yes/No responses to both of these questions are represented by variable *green1*. If a respondent answered yes to either of these two categories then he or she is considered a *green* respondent.
- Visitors' knowledge about park's purposes was measured in the following way: all respondents were asked to select five purposes out of ten (named based on the international definition of protected areas) that they thought best characterize Órség National Park (Getzner 2009). If they got at least four of them right then they know the park's purposes, if less than four then they do not know the purposes.

- The original dependent variable included a major outlier (4,000 HUF) which created a significant positive skewness. To ease this, the amount was dropped from the dataset; consequently variable *daily* does not include this value any more.

Prior to running the regression probability weights were added to the dataset to adjust for disproportionate sampling of households or sampling bias (Hamilton 2009). This was necessary since some households in the dataset contained more adults than others. With probability weights added conclusions can be drawn about the population of all adult visitors. (The dataset was not modified with post stratification weights due to a lack of existing tourists profile, i.e. a representative tourist sample).

Table 9 demonstrates the result of the OLS multiple regression model<sup>10</sup>. This model includes all the previously listed independent variables and seven variables that represent the following ecosystem services: water, food provided by nature, climate regulation, recreation, environmental education, cultural traditions and local food. The reason why we decided to only include these seven services in the model is that these are the ones that were chosen by a high percentage of respondents for either the first, second or third most important service. This can be seen in Table 7, which shows that after environmental education there is a noticeable drop in the percentage of tourists ranking a given service.

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<sup>10</sup> We also ran an unweighted regression with robust standard errors, to check whether heteroskedasticity might be affecting the conclusions. The robust estimates (see appendix C) agreed with our original weighted regression results, which are presented in Table 9.

All ecosystem service variables are dummy variables, with a value of either 0 or 1. 1 represents if a certain service was ranked by a respondent either for first, second or third most important service, and 0 represents if that service was not chosen by a respondent at all.

**Table 9: Regression of WTP on socio-economic, attitude, park use, opinion and ecosystem service variables**

Variable	OLS multiple regression model	
	coefficient	t-value
oath	-3	-0.04
gender	43	0.55
age	-8	-2.45***
rincome	45	1.87*
protect	-25	-0.54
manage	4	0.11
substitute	23	0.84
cover	103	4.13***
green1	194	2.19**
knowledgeQ	-97	-1.09
duration	-46	-3.24***
water1	61	0.58
nfood1	-21	-0.21
climate1	13	0.14
recreation1	101	0.89
envedul	92	0.87
tradi1	-79	-0.89
lfood1	-55	-0.66
[constant]	855	
n = 206		
Two-sided t tests: *** p<.01; ** p<.05; * p<.10 R <sup>2</sup> = 22%		

Prior to analyzing results from the model we examined if multicollinearity existed among the independent and service variables in order to ensure that these variables have independent variation (Hamilton 2009). Table 10 demonstrates these results that were



obtained by a STATA command that is equivalent to regressing each predicting variables on all of the other independent variables.  $1/VIF$  column represents the calculation of  $1 - R^2$  and shows what portion of a predicting variable's variance is independent of the others. The variance inflation factor (VIF) column measures how much of the coefficients' variances of other variables increase while including that variable in the model (Hamilton 2009).

**Table 10: Check for multicollinearity**

Variable	VIF	1/VIF
recreation1	1.77	0.564118
water1	1.75	0.569884
nfood1	1.71	0.585208
climate1	1.69	0.590819
tradi1	1.69	0.591960
lfood1	1.63	0.611799
envedul	1.48	0.675733
age	1.22	0.818019
substitute	1.18	0.844780
cover	1.14	0.879336
oath	1.13	0.885139
rincome	1.12	0.893230
manage	1.11	0.898151
green1	1.11	0.901747
duration	1.10	0.910960
protect	1.10	0.912735
gender	1.08	0.927250
knowledgeQ	1.07	0.937589
<b>Mean VIF</b>	1.34	

The high portion of unique variance for all predictors, and a mean variance inflation factor very close to 1, indicated no problems with multicollinearity.

Interpreting results from Table 9: Due to missing values only 206 observations were included in the model. The model's  $R^2$  is 22, consistent with other CVM studies. The model shows that five out of the 18 independent variables included in the model are statistically significant. Variable *rincome* is significant at the 90% level, variable *green* at the 95% level and variables *age*, *cover*, and *duration* were statistically significant at the 99% level. None of the ecosystem service variables are significant. Besides variable *cover* the other three attitude variables do not significantly determine visitors' WTP. Since the oath has a statistically non-significant effect on respondents' willingness to pay, the dataset was not separated between the two sub-samples. The results of this linear model can be further supported with a log-log model that also resulted in the same significant variables (for detailed results please see appendix D). Because the linear model best fit for the data, final results are presented from this model.

Initially I also examined the effect of respondents' certainty about WTP, since respondents got to choose from a scale of 1 to 10 about their certainty in actually paying the WTP that they selected (1 indicating very uncertain, 10 absolutely certain). These were then reduced to two categories, 1 to 7 representing uncertain and 8 to 10 representing certain (Champ and Bishop 2001). We expected to see lower WTP for those who were certain, but the variable had a non-significant effect and even reduced the

model's sample size (due to missing values) and efficiency. Therefore I decided not to include it in the model<sup>11</sup>.

### **Independent Variables that Explain WTP – Hypotheses Test**

Based on the linear multiple regression model it can be stated that the following five independent variables all together explain 22 % of the variance of Órség National Park visitors' willingness to pay for ecosystem service protection: *age*, *rincome*, *cover*, *green1* and *duration*. These variables are all significant either at the 90%, 95% or 99% level, and their signs are all consistent with what was hypothesized:

- Visitors' length of stay in the park negatively influences WTP for a daily user fee, thus tourists who stay for several days in the park are willing to pay a lower amount for the daily fee than those who only stay for one or couple of days.
- Respondents who agreed that each visitor should take part in covering the cost of tourism are willing to offer a higher WTP for the daily user fee.

Signs are also consistent with what was expected based on previous CVM studies: Visitors' age negatively influences WTP, something that was also found by Marjaine (2000) for cave protection, while their monthly net income has a positive influence on it, which is consistent with Getzner's (2009) findings. Finally, visitors who are "green" (are

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<sup>11</sup> Though after modification of the one extreme value of WTP no other outliers or influential cases were detected in the dataset, unweighted robust regression was also utilized due to a slight positive skewness. Robust regression showed the same significant predicting variables, and very similar values for standard errors, t-statistics and significance level, as shown in appendix E. The only difference is that variable *green1* had only a .1 level of significance, and variable *age* and *rincome* were significant at the .05 level. Since OLS regression is more efficient than robust regression and since standard errors are the smallest in the OLS model, results from this model is presented and used for further analysis.

either members in a conservation organization and/or donate for conservation purposes) stated a higher WTP for the daily user fee. This was also found by Marjaine (2000).

Signing the Oath of honesty by a respondent did not significantly influence WTP. This is not consistent with the most recent research on hypothetical bias that found a significant negative relationship between signing the Oath of honesty and WTP in Western Europe and the US (Jacquemet et al. 2009; Stevens et al. 2009). This could be due to variance in hypothetical bias that Ehmke et al. (2008) found to be effected by different national behavior that is rooted in different cultures.

Since none of the ecosystem service variables have a significant effect based on the multiple regression model, we have to conclude that we cannot identify any significant relationship between WTP and ecosystem services that are more highly ranked than others. What we know based on the 211 respondents included in the sample is that these visitors found cultural traditions, local natural food, climate regulation and recreation to be the most important services provided by Örség National Park.

#### **Aggregation of WTP estimates**

In order to calculate the total value that the population of all tourists visiting Örség National Park is willing to pay for a daily user fee to ensure ecosystem protection, the mean WTP<sup>12</sup> estimate was multiplied by the approximate number of yearly visiting tourists. Annual visitation numbers were obtained from the park management and it has

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<sup>12</sup> Though mean WTP values are usually higher than median estimates, when they are not highly influenced by extreme outliers and/or biased responses (previously removed or modified) “mean WTP values are the most appropriate, since in economic theory they are a cardinal measure of the utility individuals derive from the good” (Garrod and Willis 1999, 139). In this study the mean WTP value is only 1.3 times as high as the median, therefore one can see that it is not dramatically affected by outliers.

to be emphasized that this number is an approximate estimate and very conservative due to the following reasons:

- Undertaking a visitor count is nearly impossible caused by the lack of entrance fee and open access.
- Visitor estimates could only be obtained from establishments where tourists are required to pay for goods or services.

Based on these, the annual visitation number was estimated to be 70,000 (Kevy 2011). This multiplied by the mean WTP value of 655 HUF equals 45,850,000 HUF.

Considering that tourists stay in the park for an average of 4.7 days, to estimate the total direct rent capture we also multiplied the total WTP by this number. This resulted in an amount of 215,495,000 HUF. This value represents the amount of money that all tourists visiting Órség National Park would be willing to pay in the form of a daily user fee to ensure that the park's ecosystem services will enjoy a continuous protection.

Consequently the amount of 215,495,000 HUF represents the economic rent that beneficiaries (recreational users) would be willing to pay for the conservation of Órség National Park's ecosystems, but is currently not captured by park management.

#### **Evaluation of WTP estimates**

Signs of significant variables in this study are consistent with previous studies' findings, therefore we can conclude that the WTP estimate meets the construct validity of CVM. To meet the content validity we made sure that we

- set up the hypothetical market in the most realistic way,
- chose WTP instead of WTA based on existing property rights in the park,

- carefully considered political and taxation circumstances of the country, as well park characteristics when we decided to use the user fee for the payment vehicle,
- conducted a pretest to set up the final payment bids,
- reminded the respondents about their budget constraints and their other expenses made in the park prior to asking them to state their WTP.

Due to the lack of actual payments the criterion validity could not be measured.

### **Demographic Characteristics of Órség National Park Visitors**

Table 11 shows an average tourist profile visiting Órség National Park.

**Table 11: Characteristics of an average Órség National Park visitor**

<b>Parameter</b>	<b>Characteristics</b>
Age (mean)	40 years old
Km traveled to get to park (mean)	287 km
Duration of stay (mean)	4.7 days
Money spent on (mean):	
Accommodations	36.800 HUF
Meals	25.500 HUF
Fees for entrance and educational activities	5.100 HUF
Fees for sports activities	1.324 HUF
Cultural events	1.459 HUF
Shopping	5.010 HUF
Other	789 HUF
Education	Graduate school
Income (median)	300.000 HUF

Though the majority of park visitors are Hungarians (97%), respondents in this sample also included international tourists from Germany (0.95%), Austria (0.47%), Belgium (0.47%), France (0.47%) and Norway (0.47%).

The shortest distance that visitors traveled to get to the park was 5 km, and the longest was 2,500 km. While majority of visitors drive to the park, the following other transportation modes are also used to get to the park: train (11%), tour bus (4%), bus (3%), motorcycle (0.4%), airplane (0.4%) and bicycle (0.2%). The duration of stay ranges

from one day to 14 days. Most of the visitors who stay in the park overnight spend the night in Óriszentpéter (53%), followed by Hegyhátszentjakab (29%) and Szalafő (19%). Most of the tourists visited the park only once in the past 12 months (which was the period of July-August 2010 to July-August 2011). The distribution of number of park visits can be seen in Table 12.

**Table 12: Distribution of park visits by tourists in the past 12 months**

<b>Number of visits</b>	<b>Percentage</b>
Once	82
Twice	9
Three times	3
Four times	1
More than four times	5
Total	100

76% of respondents stated that their main motive for going to the region was to visit the national park. 23% had other destinations to visit and they took the chance to visit the park, while one percent was in the area and decided to go to the park as well. All respondents were asked to choose three main activities that they went to the park for from the ones that are listed in Table 13.

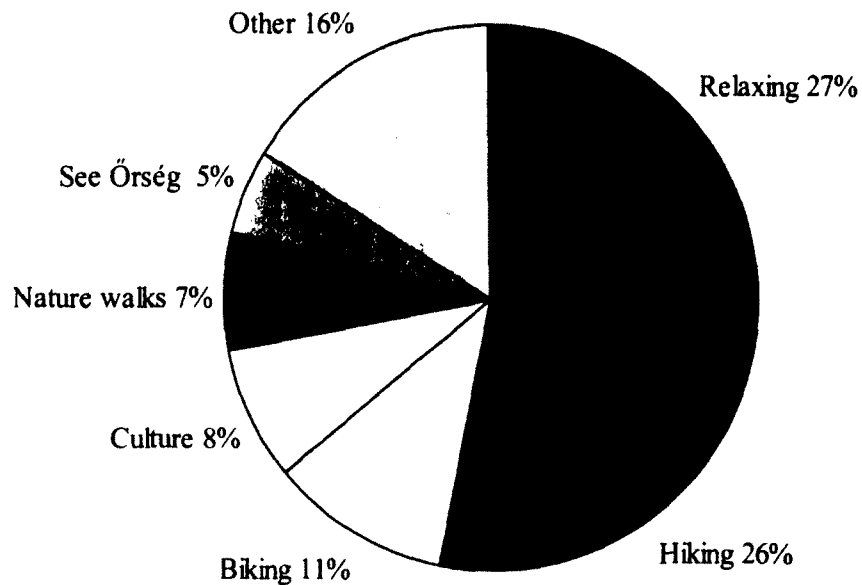


**Table 13: Main activity of tourists in Órség National Park**

<b>Main activity</b>	<b>Percentage</b>
Hiking	79
Visitation of national park facilities	63
Nature and wildlife observation	60
Sport activities (biking, horseback riding, fishing, swimming)	22
Cultural activities	15
Collection of forest produce	9
Environmental education	8
Visit restaurants	6
Special event	3
Other (motorcycling, gastronomy, pottery, georeaching)	3

Results show that hiking is the most commonly enjoyed activity in the park, chosen by 79 percent of respondents. This is followed by Visitation of park facilities (63%) and Nature and wildlife observation (60%). Sport activities (22%) and other Cultural activities (15%) are also enjoyed by many visitors. Those visitors who solely went for the purpose of visiting the national park were also asked to state one activity as their primary purpose of the visit. Figure 6 summarizes these primary purposes.

**Figure 6: Primary purpose for visiting Őrség National Park**



One can see that most tourists go to Őrség National Park with the purpose of relaxing. This is closely followed by the reason of hiking. Category other includes: See the traditional Őrség architecture, Camping, Fishing, Gastronomy and Horseback riding. Tourists were asked if they visited or were planning to visit any cultural sites within the park where they had to pay an entrance fee, and if they participated or were planning to participate in any guided tours they had to pay for. While 84 percent of the respondents paid for visiting cultural sites, only 26 percent stated that they participated in guided tours they were charged for.

50 percent of respondents agreed that the national park should receive more funding from the government. 42 percent said that they had no opinion on this topic, and eight percent did not think that the government should give any more money to the park.

Those respondents who agreed were also asked to state a public service that should receive less funding from the government, i.e. where the reallocation to the park should be coming from. The following public services were named by respondents:

- Politics (29%)
- Welfares (11%)
- Military (8%)
- Politicians' compensation (7%)
- Bureaucracy (7%)
- Public services and celebrations, including fireworks (5%)
- Soccer (5%)
- Sports (4%)
- Bank consolidation (4%)
- Highways (3%)
- Education (3%)
- Wasteful public investments (2%)
- Media (2%)
- Other (10%): investment for the city of Budapest, churches, civil service, diplomats, culture, energy, wasteful central heating in apartments, public lights and pensions.

## CHAPTER V

### IMPLICATIONS

#### **Conclusion and Implications**

The three major objectives of this thesis were to find out if there is an uncaptured economic rent associated with ecosystem service protection in Órség National Park, to reveal the relative importance of the park's ecosystem services to respondents and to reveal factors that explain the variation of a positive willingness to pay, if any. We specifically sought to discover if the oath of honesty and the most preferred ecosystem services would be included in these determinants. All goals of this study were achieved while utilizing a contingent valuation method that employed the payment card mechanism. The contingent valuation method was administered via face to face interviews.

Findings from the multiple linear regression analysis show that respondents' age, income, length of stay in the park, as well as being environmentally conscious, and agreeing with the fact that each visitor should take part in covering the cost of tourism significantly influenced stated WTP values.

At the same time none of the most preferred ecosystem services had a statistically significant effect on WTP estimates. Neither did signing the Oath of honesty have a significantly negative effect on WTP in Hungary, as previous research showed was the case in the US and Western Europe. Since there are various cultural differences among

these countries, further research could examine if this is caused by geographic variances in hypothetical bias associated with CVM. It is highly possible that hypothetical bias – thus, overstating WTP values – is low amongst Hungarians to start with, and that is why there is no significant difference between mean WTP with the Oath or without it.

From research findings we can also conclude that there is a positive economic rent that is currently not captured by park management. This means that recreational users are willing to pay an average of 655 HUF for a daily user fee to contribute the preservation of Órség National Park's most valued ecosystem services. This – if utilized – on a yearly basis would represent an additional financing option and would help support park protection with a supplementary of 215,495,000 HUF. Based on the park's 2010 fiscal year, this amount would represent a supplement that would increase the budget by 49 percent (Szentirmai 2012). We must point out though that this is a conservative amount since it only takes into account an annual tourism number that could be documented by the park management.

It is also important to point out that Órség National Park visitors mostly appreciate ecosystem service protection that realizes the preservation of the park's cultural monuments, and ecosystems that provide local natural food, climate regulation and recreational opportunities. Therefore, park management should ensure that the priority is given to the conservation of these ecosystem services – if they ever plan to utilize a daily user fee charge as additional financial mechanism to help ease budgetary problems.

### **Limitations and Future Research Needs**

Due to limited financial resources this study was only able to obtain information from a small number of respondents. Therefore the small sample size that we drew conclusions from for the population of all tourists visiting Órség National Park is definitely a limitation of this thesis. Besides the small sample size, this study also suffers from seasonal sampling.

Another limitation to this thesis is the lack of information from permanent and seasonal residents who live within the boundaries of Órség National Park. Further research could reveal their preferences towards the park's ecosystem services as well as willingness to pay estimates. A separate study on residents' profile would give the park management the opportunity to compare findings and include their preferences as well in future policy makings. Due to available information received with survey questions future research could also calculate the value of Órség National Park while using the travel cost method. This would allow the researcher to make a comparison on the use value of the park estimated by the contingent valuation and the travel cost method.

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## **APPENDIX A**

## Resident and visitor Questionnaire – Őrségi National Park

Ildiko Losonci, a researcher from the University of New Hampshire is carrying out this survey to determine visitor preferences of Őrségi National Park and to identify the value visitors place on the park and its recreational opportunities. Filling out this questionnaire will help the park management to identify a visitor profile, the purposes why tourists visit the park and what ecosystem services provided by the park are the most valued.

Responses will be treated strictly confidentially and will only be used for research purposes. Filling out the questionnaire takes about 20 minutes.

1. Are you an Őrségi National Park resident?

\_\_\_\_\_ Yes

\_\_\_\_\_ No

2. If yes, are you a permanent or seasonal resident?

\_\_\_\_\_ Permanent

\_\_\_\_\_ Seasonal

3. What is your home town?

..... (city/town) and ..... (postal  
code)

..... (country)

4. Approximately how many kilometers did you travel to get to the national park?

..... km

5. Which transportation mode did you use to travel to the national park? Choose the primary one that applies:

\_\_\_\_\_ Car

\_\_\_\_\_ Train

\_\_\_\_\_ Bus

\_\_\_\_\_ Tour bus

\_\_\_\_\_ Bicycle

\_\_\_\_\_ Airplane

☐ Motorcycle  
☐ By Foot  
☐ Other (please specify) .....

6. What is the duration of your current visit?

..... number of hours      OR      ..... number of days

7. If the duration of your current visit is longer than a day, where are you staying overnight?

..... (name of town)

8. How many times have you visited the park in the past 12 months (including today)?

☐ Once  
☐ Twice  
☐ Three times  
☐ Four times  
☐ More than four times

9. Compared to previous years, did you visit the park in the past 12 months

☐ Less  
☐ More  
☐ As often as in the past

10. Compared to the past 12 months, are you going to visit the park in the future

☐ Less  
☐ More  
☐ As often as in the past  
☐ I don't know

11. How well informed do you feel about:

Please circle the appropriate number

(1=not at all, 5=very well)

a. The purposes of the national park	1	2	3	4	5
b. Species and nature conservation programs of the national park	1	2	3	4	5
c. Recreation activities and possibilities in the park	1	2	3	4	5
d. Cultural and educational activities offered in the national park	1	2	3	4	5

12. Őrségi National Park has, according to the international definition of protected areas, a number of purposes. Please select five purposes that you think best characterize the Őrségi protected area:

- ☐ Provision of education and information on nature conservation
- ☐ Conservation of natural habitats and species
- ☐ Minimization of human activity and community participation
- ☐ Scientific research on nature conservation
- ☐ Construction of new infrastructure for tourism and development
- ☐ Maintenance of traditional agriculture and provision of natural products
- ☐ Assurance of recreational opportunities
- ☐ Provision of visitor facilities
- ☐ Increased tourism activities
- ☐ Maintenance of a balanced interaction between nature and people while sustaining local cultural values

13. What are your main activities in the national park? Please select maximum three:

- ☐ Hiking
- ☐ Nature and wildlife observation
- ☐ Sports activities
- ☐ Visitation of national park facilities and exhibitions
- ☐ Cultural activities
- ☐ Collection of forest produce (mushrooms, herbs)
- ☐ Visit restaurants and huts
- ☐ Environmental education
- ☐ Special event
- ☐ Other (please specify) \_\_\_\_\_

14. How important was the following to you when you chose Őrségi National Park as your travel destination? (1=not at all, 5=very important)

- |   |   |   |   |   |   |
|---|---|---|---|---|---|
| a. Peace and quiet                                      | 1 | 2 | 3 | 4 | 5 |
| b. The opportunity to see rare plant and animal species | 1 | 2 | 3 | 4 | 5 |
| c. Undisturbed nature                                   | 1 | 2 | 3 | 4 | 5 |
| d. Traditional agricultural practices                   | 1 | 2 | 3 | 4 | 5 |

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| e. Good air quality                      | 1 | 2 | 3 | 4 | 5 |
| f. Guided tours                          | 1 | 2 | 3 | 4 | 5 |
| g. Cultural events                       | 1 | 2 | 3 | 4 | 5 |
| h. Local food (Honey, mushrooms, cheese) | 1 | 2 | 3 | 4 | 5 |

15. What was your main motive for visiting the region? Please select only one.

\_\_\_\_\_ I came solely for the purpose of visiting the national park.

\_\_\_\_\_ I had other destinations to visit in the region and took the chance to visit the park.

\_\_\_\_\_ I was in the area and decided to come to the park.

16. If you came solely for the purpose of visiting the national park, what was the primary purpose of your visit? (Please write only one activity).

.....

17. During your current visit did you or are you planning to participate in any guided tours in the park you have to/had to pay for?

\_\_\_\_\_ Yes

\_\_\_\_\_ No

\_\_\_\_\_ I don't know

18. During your current visit did you or are you planning to visit any cultural sites within the park where you had to/have to pay an entrance fee?

\_\_\_\_\_ Yes

\_\_\_\_\_ No

\_\_\_\_\_ I don't know

19. Ecosystem services are services that nature provides and are directly enjoyed, used or consumed by humans. In this way these services contribute to human well-being.

Which ecosystem services provided by Órségi National Park are most important to you?

Please rank the **top three that apply**: (1 = most important)

\_\_\_\_\_ Provision of water supply and quality

\_\_\_\_\_ Timber products

\_\_\_\_\_ Food provided by nature: Honey, mushrooms and other forest produce (berries)

\_\_\_\_\_ Herbs



- \_\_\_\_\_ Air quality regulation and carbon sequestration (climate regulation)
- \_\_\_\_\_ Erosion regulation
- \_\_\_\_\_ Fishing and hunting
- \_\_\_\_\_ Pollination
- \_\_\_\_\_ Recreation / tourism
- \_\_\_\_\_ Environmental education
- \_\_\_\_\_ Maintenance of cultural traditions
- \_\_\_\_\_ Local natural food: cheese, pumpkin-seed oil

20. Please approximate how much money your party expects to spend in the local area during your park visit:

- a. Accommodations ..... HUF
- b. Meals ..... HUF
- c. Fees for entrance and educational activities ..... HUF
- d. Fees for sports activities ..... HUF
- e. Cultural events ..... HUF
- f. Shopping ..... HUF
- g. Other ..... HUF

21. Including yourself how many people in your group shared these trip expenses?

..... = number of people sharing expenses

22. For each of the following statements please indicate the extent to which you agree or disagree. (Please value with 1=not at all, 5=totally agree)

- a. Conserving natural resources is more important than providing tourism.

1                      2                      3                      4                      5

- b. Wildlife and habitat protection has been overemphasized at the expense of recreation at this park.

1                      2                      3                      4                      5

- c. I feel a strong personal obligation to protect wildlife and wildlife habitat

1                      2                      3                      4                      5

- d. The park management should take more measures to protect wildlife and wildlife habitat

1                      2                      3                      4                      5

e. Due to nature conservation regulations my use of the park is already too restricted.

1 2 3 4 5

f. If the Órségi National Park would not be accessible, I would not be able to obtain a similar experience elsewhere.

1 2 3 4 5

h. Steps should be taken to reduce the number of visitors to the park.

1 2 3 4 5

g. Each visitor should take part in covering the cost of providing tourism activities in Órsegi National Park.

1 2 3 4 5

*If you are an Órségi National Park **resident** please answer question # 23 and skip question # 24. If you are a **visitor** of Órségi National Park please skip question # 23 and answer # 24.*

23. The national park and its conservation programs are mostly financed by the government. Suppose that the government stopped funding these programs, so private contributions would be needed to finance and maintain the park. This contribution would be in the form of an annual pass that would allow you to visit the park any time during that year. If you were to buy this annual pass, what would be the maximum amount of money that you would be willing to pay for it? Please note that money from this contribution would directly go to the park and only be used for preserving the park's wildlife habitat (forests, grasslands and wetlands), keeping its species (such as butterfly, stork and eagle) protected, and funding recreational opportunities. Please think of this contribution as an additional cost to all your expenses made in the park and to other annual expenditures. Please consider your income before you answer this question.

This information will not be used to determine additional fees at the park.

___ 0 HUF	___ 250 HUF	___ 500 HUF	___ 750 HUF
___ 1,000 HUF	___ 1,250 HUF	___ 2,500 HUF	___ 5,000 HUF
___ 7,500 HUF	___ 10,000 HUF	___ 12,500 HUF	___ 15,000 HUF
___ 17,500 HUF	___ 20,000 HUF	___ 22,500 HUF	___ 25,000 HUF
___ 37,500 HUF	___ 50,000 HUF	___ 125,000 HUF	
___ Above 125,000 HUF			

24. The national park and its conservation programs are mostly financed by the government. Suppose that the government stopped funding these programs, so private contributions would be needed to finance and maintain the park. This contribution would be in the form of a daily user fee each time you visit and use the park. If you were to pay the daily user fee, what would be the **maximum amount of money** that you would be willing to pay for it? Please note that money from this contribution would directly go to the park and only used for preserving the park's wildlife habitat (forests, grasslands and wetlands), keep species (such as butterfly, stork and eagle) protected, and fund recreational opportunities. Please think of this contribution as an additional cost to all your expenses made in the park and to other annual expenditure. Please consider your income before you answer this question.

This information will not be used to determine additional fees at the park.

\_\_\_\_\_ 0 HUF

\_\_\_\_\_ 200 HUF

\_\_\_\_\_ 1500 HUF

\_\_\_\_\_ 500 HUF

\_\_\_\_\_ 2000 HUF

\_\_\_\_\_ 1000 HUF

\_\_\_\_\_ 4000 HUF

25. What would be your motivation for your willingness to pay this park user fee? Please rank your motivation (only the one(s) that apply) as if you had 100 points, and distribute these points giving the most to the one that is the most important to you and the least to what is the least important.

I am willing to pay this amount, because:

\_\_\_\_\_ I would like to keep this area protected so that I can enjoy it and obtain the same visitor experience any time.

\_\_\_\_\_ Nature and wildlife have a right to exist, and the existence of the park is important to me.

\_\_\_\_\_ The park should exist and stay protected for future generations.

\_\_\_\_\_ I might benefit from nature and wildlife protection in the future.

26. If you answered 0 HUF on question 23 or 24, was this because (please check only one):

\_\_\_\_\_ I cannot afford to pay any additional amount of money.

\_\_\_\_\_ I am very uncertain about my future income.

\_\_\_\_\_ I think protection efforts should be funded through sources other than private payments.

\_\_\_\_\_ Protection of the park is important, but I refuse to place a financial value on it.

\_\_\_\_\_ Protection of the park is not that important to me.

\_\_\_\_\_ Other (please specify): .....

27. Please on a scale from 1 to 10 specify how certain you are in the amount that you selected above. (1=very uncertain 10=absolutely certain).

1      2      3      4      5      6      7      8      9      10

28. Do you agree that the national park should receive more funding from the government?

\_\_\_\_\_ Yes

\_\_\_\_\_ No

\_\_\_\_\_ No opinion

29. If you agree, what public service should receive less funding from the government?

Please list only one: .....

### **Individual characteristics and demographic information**

The following questions are for statistical analysis only. I would like to emphasize again that responses will be treated strictly confidentially, and will be used in an aggregated way for research purposes only.

30. Gender

\_\_\_\_\_ Male

\_\_\_\_\_ Female

31. Age ..... (years)

32. Are you a member of a nature conservation or environmental organization?

\_\_\_\_\_ Yes

\_\_\_\_\_ No

33. Do you make donations for nature conservation purposes?

\_\_\_\_\_ Yes

\_\_\_\_\_ No

34. What is your highest level of education?

\_\_\_\_\_ Elementary school

\_\_\_\_\_ Vocational school

\_\_\_\_\_ Some high school

\_\_\_\_\_ High school

\_\_\_\_\_ 5<sup>th</sup> year

\_\_\_\_\_ Some college

\_\_\_\_\_ College

\_\_\_\_\_ Graduate school

\_\_\_\_\_ PhD

35. What is your current occupation?

\_\_\_\_\_ White-collar employee

\_\_\_\_\_ Self-employed

\_\_\_\_\_ Manual laborer

\_\_\_\_\_ Housewife/-man

\_\_\_\_\_ Unemployed

\_\_\_\_\_ Retired

\_\_\_\_\_ Student

\_\_\_\_\_ Other (Please specify): .....

36. Total number of people living in your household? .....

37. In your household what is the number of children under the age of 18? .....

38. a. What is your monthly total net household income? ..... HUF

OR

b. What is your approximate monthly net household income?

- \_\_\_\_\_ Less than 50,000 HUF
- \_\_\_\_\_ 50,001 – 100,000 HUF
- \_\_\_\_\_ 100,001 – 150,000 HUF
- \_\_\_\_\_ 150,001 – 250,000 HUF
- \_\_\_\_\_ 250,001 – 350,000 HUF
- \_\_\_\_\_ 350,001 – 450,000 HUF
- \_\_\_\_\_ 450,001 – 550,000 HUF
- \_\_\_\_\_ Above 550,001 HUF

Number of questionnaire: .....

Place of interview: .....

Date and time of interview: .....

Duration of the interview: .....

Contact information: Ildiko Losonci - University of New Hampshire, NH USA  
[ilosonci@gmail.com](mailto:ilosonci@gmail.com)

Dr. John Halstead – University of New Hampshire, NH USA  
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**Thank you very much for your cooperation!**

## **APPENDIX B**

## OATH OF HONESTY

I (undersigned) swear upon my honor that, during the whole experiment, I will:

**Tell the truth and always provide honest answers.**

Örségi National Park

Signature .....



## **APPENDIX C**

### Unweighted regression with robust standard errors

Variable	OLS regression with robust standard errors	
	coefficient	t-value
age	-6	(-2.01)**
rincome	56	(2.33)**
cover	114	(4.27)***
greenl	139	(1.64)*
duration	-44	(-3.24)***
[constant]	547	
n = 206		
Two-sided t tests: *** p< .01; ** p< .05; * p< .10      R <sup>2</sup> = 21%		

## **APPENDIX D**

### Log-log multiple regression model

Variable	Log-log multiple regression model	
	coefficient	t-value
oath	1.89	(0.54)
gender	0.12	(0.03)
lgage	-2.79	(-2.52)***
rincome	1.81	(1.59)*
protect	-2.58	(-1.22)
manage	0.23	(0.13)
substitute	1.11	(0.83)
cover	5.46	(4.52)***
green1	8.66	(2.08)**
knowledgeQ	-2.67	(-0.65)
lgduration	-14.15	(-2.33)**
water1	5.01	(0.98)
nfood1	-1.73	(-0.36)
climate1	1.39	(0.32)
recreation1	4.25	(0.78)
envedul	3.21	(0.63)
tradi1	-1.67	(-0.31)
lfood1	-1.75	(-0.43)
[constant]	68.17	
n = 206		
Two-sided t tests: *** p< .01; ** p< .05; * p< .10 R <sup>2</sup> = 22%		

## **APPENDIX E**

### Unweighted robust regression

Variable	Robust regression model	
	coefficient	t-value
age	-6	(-1.91)**
rincome	55	(2.26)**
cover	105	(3.76)***
greenl	112	(1.33)*
duration	-38	(-2.48)***
[constant]	547	
n = 206		
Two-sided t tests: *** p< .01; ** p< .05; * p< .10		

## **APPENDIX F**

# University of New Hampshire

Research Integrity Services, Service Building  
51 College Road, Durham, NH 03824-3585  
Fax: 603-862-3564

29-Jun-2011

Losonci, Ildiko  
Natural Resources and the Environment, James Hall  
30 Lisette Drive  
Salem, NH 03079

**IRB #: 5211**

**Study:** Visitor Preferences and their Willingness to Pay in the Orsegi National Park

**Approval Date:** 29-Jun-2011

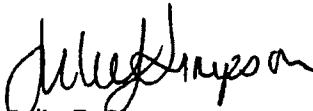
The Institutional Review Board for the Protection of Human Subjects in Research (IRB) has reviewed and approved the protocol for your study as Exempt as described in Title 45, Code of Federal Regulations (CFR), Part 46, Subsection 101(b). Approval is granted to conduct your study as described in your protocol.

Researchers who conduct studies involving human subjects have responsibilities as outlined in the attached document, *Responsibilities of Directors of Research Studies Involving Human Subjects*. (This document is also available at <http://unh.edu/research/irb-application-resources>.) Please read this document carefully before commencing your work involving human subjects.

Upon completion of your study, please complete the enclosed Exempt Study Final Report form and return it to this office along with a report of your findings.

If you have questions or concerns about your study or this approval, please feel free to contact me at 603-862-2003 or [Julie.simpson@unh.edu](mailto:Julie.simpson@unh.edu). Please refer to the IRB # above in all correspondence related to this study. The IRB wishes you success with your research.

For the IRB,



Julie F. Simpson  
Director

cc: File  
Halstead, John